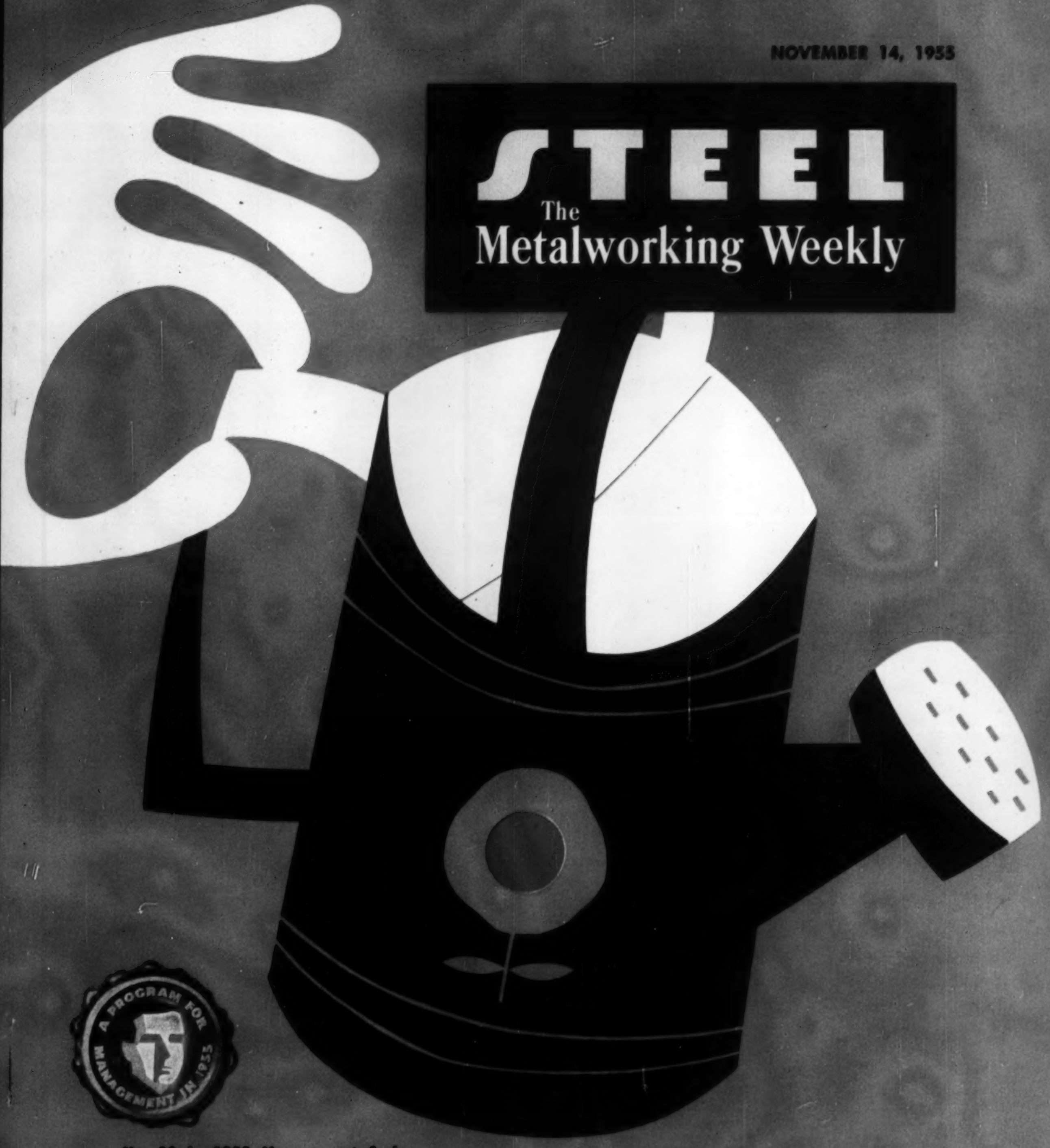
NOVEMBER 14, 1955

STEEL

The Metalworking Weekly



A PROGRAM FOR MANAGEMENT IN 1955

No. 10 in 1955 Management Series

Keep Your Product Growing

Try preventive maintenance with laboratory and marketing research before stunting begins . . . page 101

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A Metallurgist?
WHO? ME?
PURCHASING

Well, maybe not exactly, but if you buy steel it's important that you, as a Purchasing Agent, know many details for which your technical contemporaries usually get the credit. Your knowing certain fundamentals can save your company many dollars and shorten delivery time by weeks.

As a case in point, take tubing size. A recent heat exchanger job called for three pieces of 18-8 Ti (TP321) tubing, each with different diameters and lengths. They were odd sizes, not available in stock. Delivery time would have been eight to ten weeks, and the customer would have had to buy minimum mill quantities, or four times more material than he wanted.

This smart customer (1) called in helpful Mr. Tubes, (2) converted to available pipe sizes while maintaining the original working pressures, (3) purchased a more expensive grade and still saved money, (4) cut delivery to less than four weeks, (5) stayed within his original cost estimate.

You don't have to be a metallurgist to realize that a basic understanding of tubing—plus a timely assist from Mr. Tubes, your link to B&W—can often save both time and money.

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Plants: Beaver Falls, Pa.; Alliance, Ohio; Milwaukee, Wis.
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TA-5069G

There's a Bolted Steel Frame in This New Building in Florida

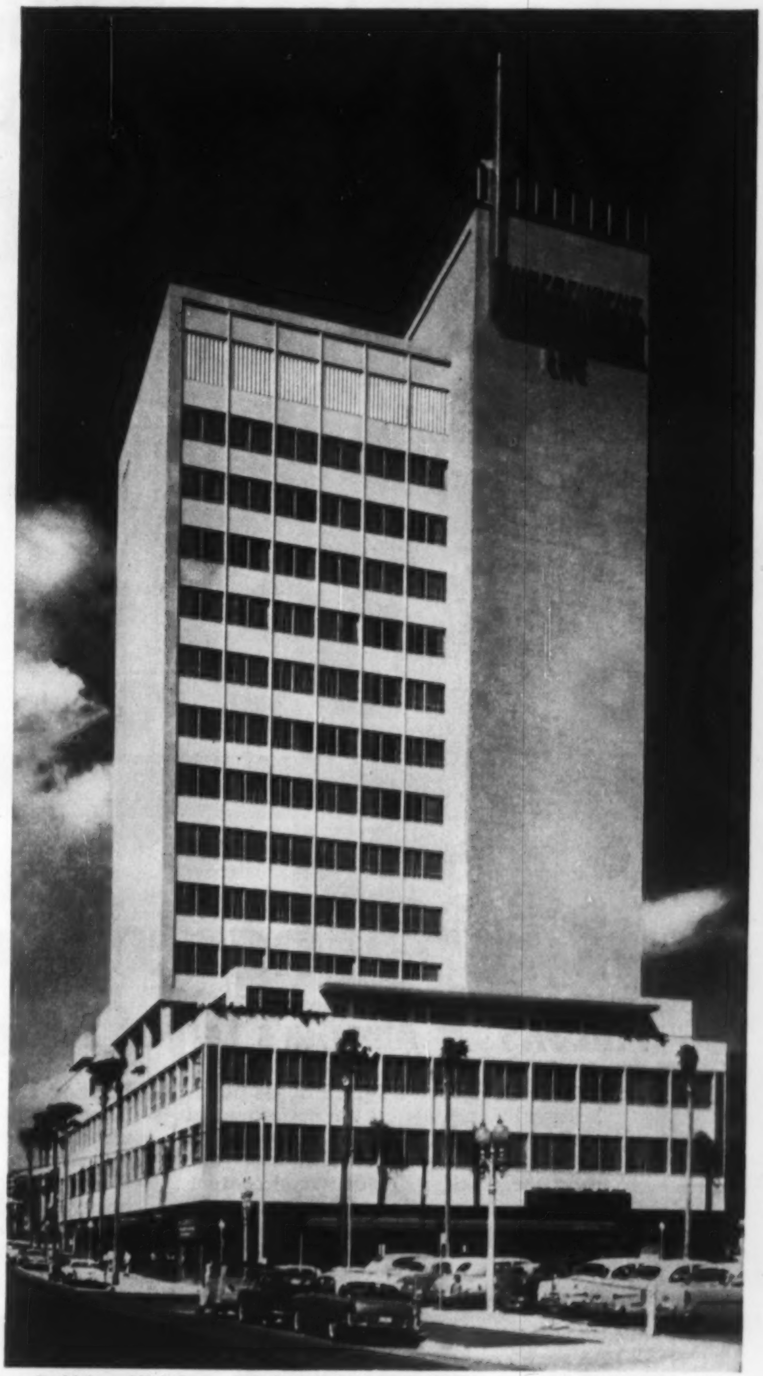
Here's a structure that is winning much favorable comment. It's the home office building of Independent Life and Accident Insurance Company, Jacksonville. It is 18 stories high, and L-shaped, and is topped by an attractive illuminated pylon of stainless steel.

The building, covering 16,800 sq ft of ground area, is faced with Indiana limestone, trimmed with glazed brick. Emerald-pearl Swedish granite is used for the first-floor facing. Mechanical equipment is grouped on the upper floors, an innovation in the Southeast for buildings of this type. The structural members making up the 1500-ton steel framework are bolted together with thousands of Bethlehem High-Strength Bolts.

Bethlehem High-Strength Bolts have come to be widely used in joining structural members. They provide permanently tight joints and make possible a saving in erection time. They are particularly desirable for construction in hospital and school zones, as the pneumatic wrench used in tightening the nuts is less noisy than a riveting gun.

Bethlehem High-Strength Bolts are made of carbon steel, and heat-treated by quenching and tempering, meeting every requirement of ASTM Specification A-325.

Save time by using Bethlehem High-Strength Bolts in your next construction job. The nearest Bethlehem sales office will be pleased to supply full information. Or drop a line to us at Bethlehem, Pa.



Bethlehem High-Strength Bolts join structural members of 1500-ton framework for Independent Life and Accident Insurance Company building, Jacksonville. Steel fabrication and erection by Bethlehem. *Architects:* Kemp, Bunch & Jackson; *General Contractors:* S. S. Jacobs Company; *Consulting Structural Engineer:* J. L. McCollough.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

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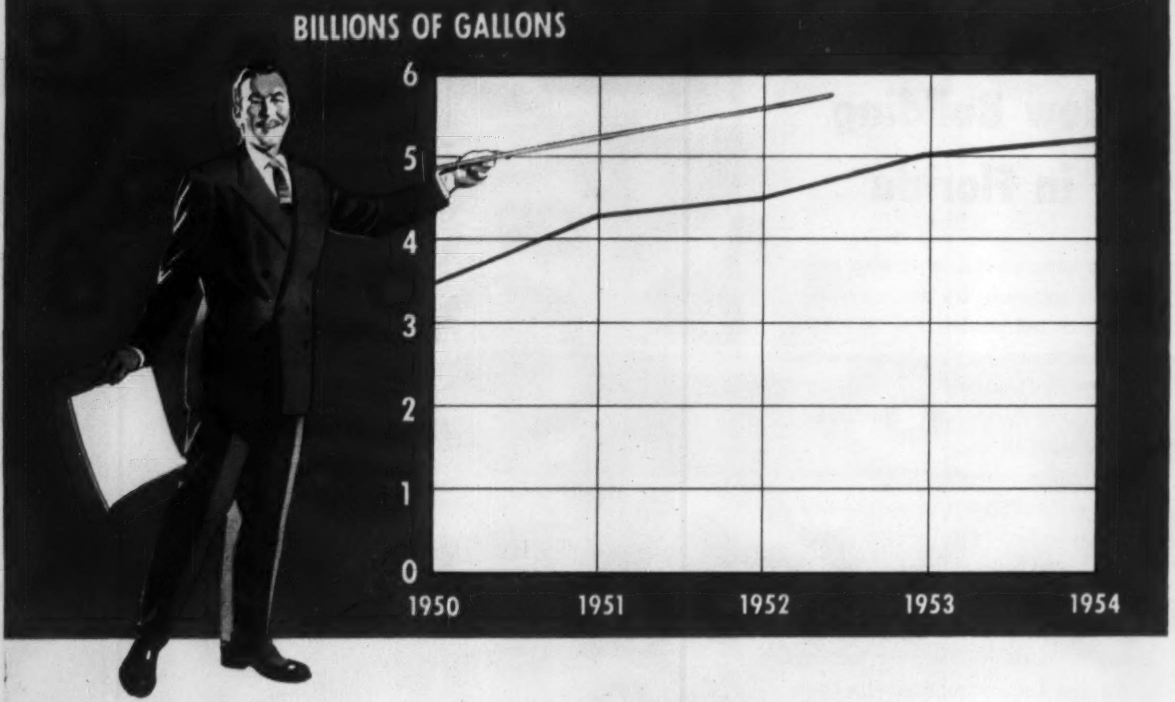

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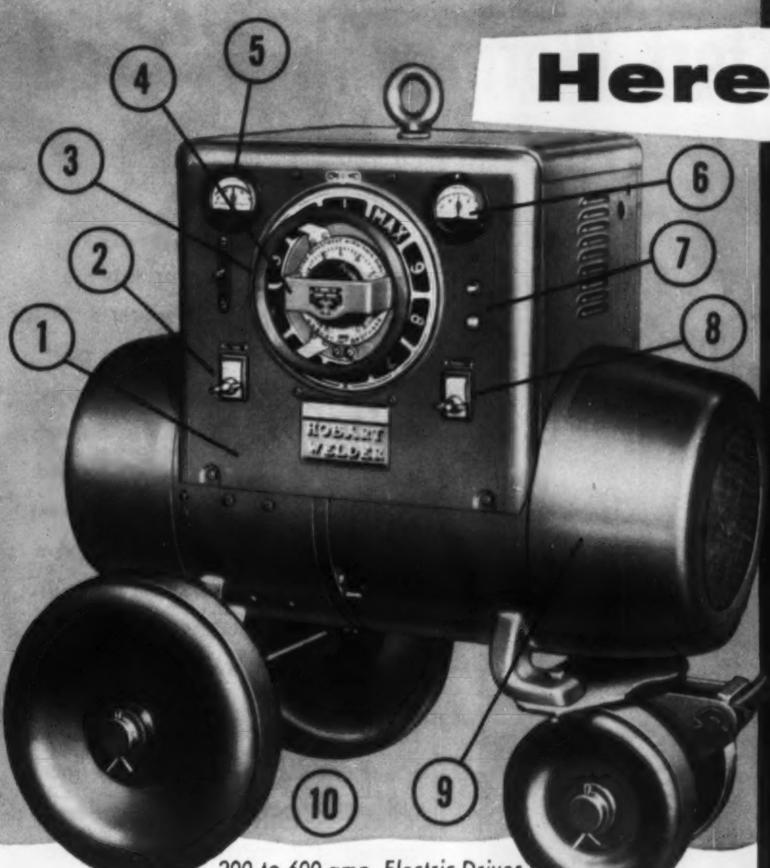

200 to 600 amp. Electric Drives

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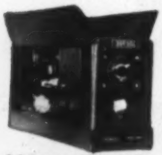
Hobart Brothers Co., Box ST-115, Troy, O., Ph. 21223.



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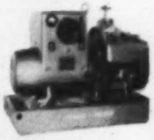
200 amp. "Husky Boy"



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POSITION____________

FIRM____________

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CITY____________ **STATE**____________

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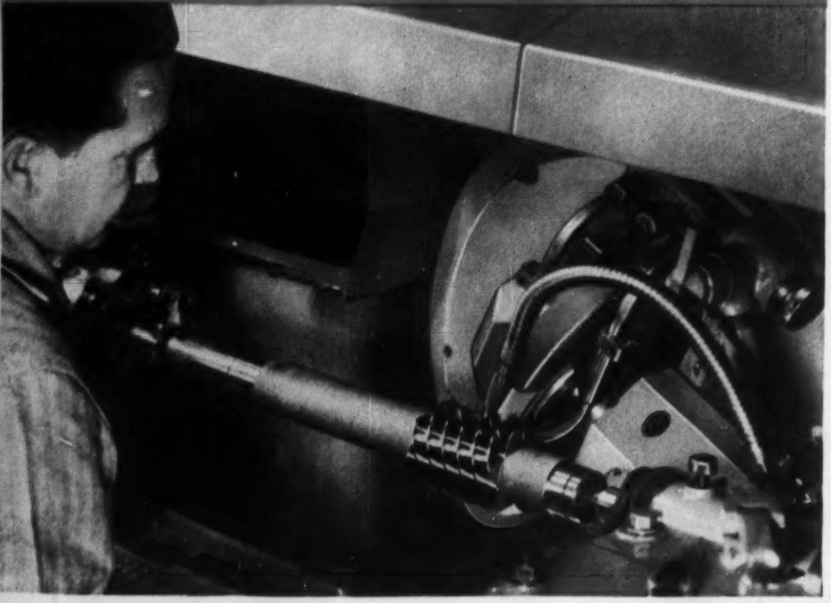

In the photograph at the left the operator is grinding a worm shaft for use in a special machine. The part is about 22" long and the worm is 4½" long, 3.430" O.D., has 5 starts, a pitch of .800", a lead of 4" and a tooth depth of .5454". The worm was ground in two operations on a standard Style 36 Thread Grinder. It was rough ground from the solid, hardened, then finish ground.

For complete information and specifications on the Style 36 and other Ex-Cell-O Thread Grinders contact your local representative or write today to Ex-Cell-O.

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STEEL
The Metalworking Weekly

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Editorial & Business Staffs, 16. Advertising Index, 188. Editorial Index available semiannually. STEEL also is indexed by Engineering Index Inc., 29 W. 39th St., New York 18, N.Y.

Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, O. Subscription in the United States and its possessions, Canada, Mexico, Cuba, Central and South America, one year, $7.50; two years, $15; all other countries, one year, $20. Single copies (current issues), 50 cents. Metalworking Yearbook issue, $2. Accepted as controlled circulation publication at Cleveland.
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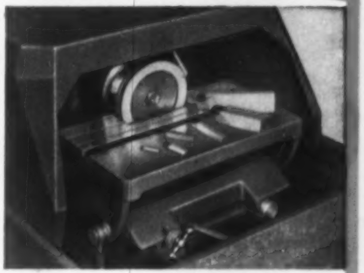
This Sturdy Precision
Tool Grinder
BY EX-CELL-O

Style 44-A, is one of the newest in a complete line made by Ex-Cell-O for sharpening carbides, high speed steels, and cast alloys. All are double end models, equipped for face grinding on cup-type wheels; for efficient and economical conditioning of single-point tools.



Tables are big to give good support to the tools. They are easily adjustable.

There are Ex-Cell-O Tool Grinders to suit the needs of every shop, large or small. For data on this complete Tool Grinder line, write Ex-Cell-O in Detroit, or call your local Ex-Cell-O representative.

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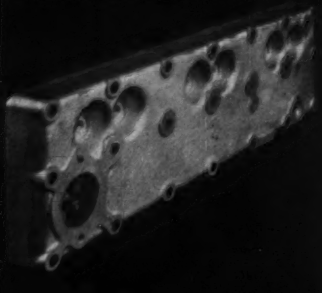

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behind the scenes

Bridge Lesson

Several weeks ago, when the Autumn leaves were at the height of their glory, we made a pilgrimage to northern Michigan and Wisconsin. We didn't know that the brilliant colors of dying leaves in Autumn were due partly to chemical change in the decaying chlorophyll, and partly to the exposure of pigment cells previously concealed by the abundance of chlorophyll and other features of vital activity. Isn't that a crock? Imagine getting ready to feast your eyes on a sea of color, and then finding yourself sidetracked by a consideration of exposed pigment cells and rotten chlorophyll!

Perhaps facts and figures are a matter of interest. When we came to the Straits of Mackinac and saw the mighty $100-million bridge under construction, we simply couldn't memorize *enough* facts and figures. Here are a few for your consideration:

Pronounced "Mack-i-naw", the new 5-mile bridge will link the upper and lower peninsula of Michigan. It will require 41,000 miles of cable wire, weighing approximately 12,500 tons. Length of the main span, 3,800 ft; length of suspension bridge (longest in the world) 8,614 ft; length of bridge and approaches, 26,195 ft; height of main towers above water, 552 ft; depth below water, 200 ft. It may open in November, 1957.

It's quite a thrill to burst from a scarlet and gold forest and see the great towers rising from the wind-whipped waters of the Straits. A stranger up from Nubia, rounding a bend and stumbling upon the construction of the Pyramid of Cheops, very likely may have experienced the same feeling.

More Tips For Management

Development of things, from pyramids to bridges, reminds us that STEEL artist Tom Bryan devised the cover you stared at a moment ago. "I received orders," he says "to design a cover calling attention to product development. The tentative headline: Keep Your Product Growing.

"All I could think of," he recalls, "was a sprinkling can."

"Keep your product growing" (page 101) represents the final Program for Management story of this year. Editors Walt Campbell, John Morgan and Bill Dean collaborated on this one, with Bill writing the final draft. It suggests how marketing and laboratory research can be properly utilized to keep you one jump ahead of technological and economic developments.

Don't let Tom's crooked sprinkling can fool you. He's an avid gardener, and the model he used is probably sprung from heavy work and sprinkling around corners.

Quiz Kid Clicks

Eastern Copper & Brass Co. Inc., The Bronx, N. Y., is the home of a new houseorgan, "Guidepost", produced by the company president, Herbert Barchoff. Mr. Barchoff displayed some of his acumen by printing a short quotation from STEEL concerning a new monthly aluminum production record. He also ran a ten-question quiz on metals, which our associate editor Bob Jaynes answered in a flash.

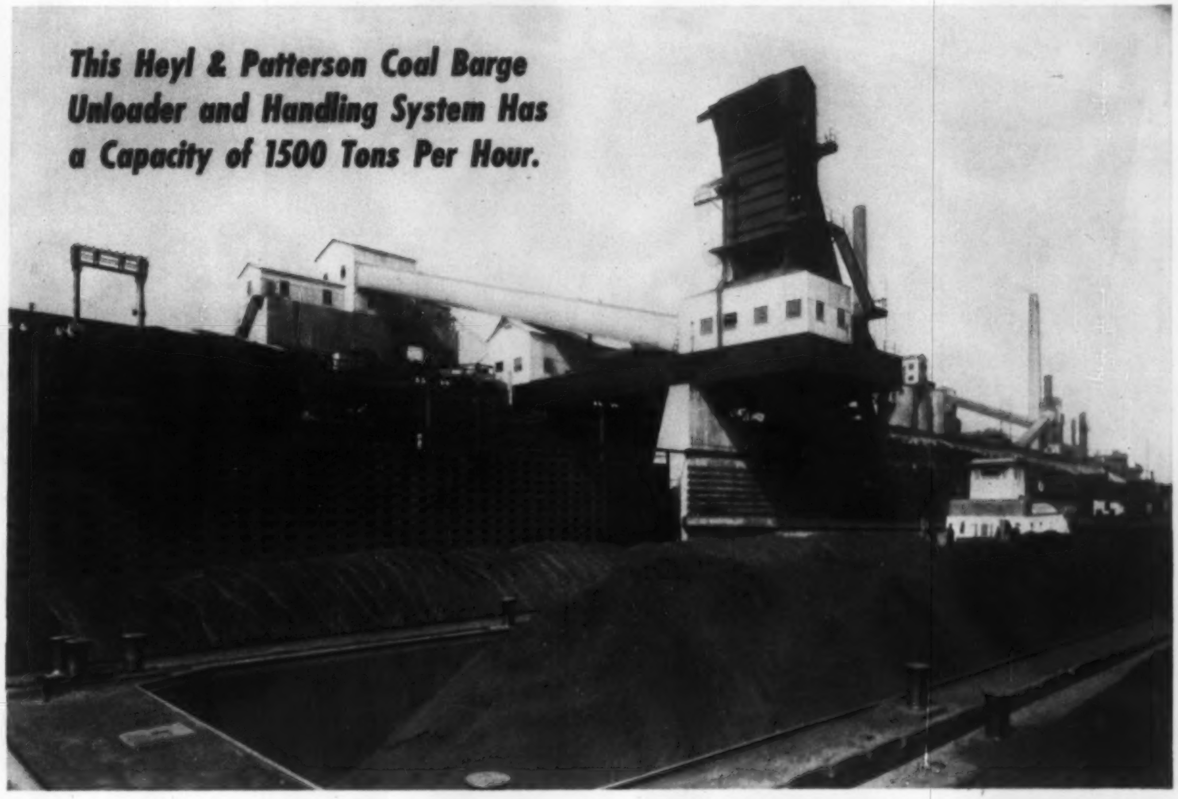
A few days later Jaynes received a handsome set of cufflinks and a tie-clasp from Eastern as a reward for answering the questions correctly. The ornaments feature the Eastern trademark, a weathervane cock in gold on a white enamel background. Properly to display these trinkets, Jaynes has taken to wearing a shirt and a tie ever since.

The metal quiz is a good idea. Try these 10 questions: 1. How many metals are there, anyway? 2. How many metals begin with M? 3. What's the difference between malleability and ductility? 4. Are you on good terms with your mother-in-law? 5. What are the three principal methods of producing steel? 6. Name 12 classes of metalworking machines, such as lathes, etc. 7. What steel companies have announced expansion plans? 8. What is the average cost of a pound of nickel? 9. What are the four principal forging methods? 10. Do you know anybody in Tierra Del Fuego?

Shrdlu

(Metalworking Outlook—Page 53)

IN THE ALIQUIPPA WORKS OF JONES & LAUGHLIN STEEL CORP.


This Heyl & Patterson Coal Barge Unloader and Handling System Has a Capacity of 1500 Tons Per Hour.

Unloader Operation Is Controlled By One Man

The giant coal barge unloader handles J&L's Aliquippa Works normal daily requirements of 10,500 tons of coal.

As the loaded barge is moved slowly under the unloader, coal is hoisted by a continuous elevator comprised of two lines of 7′ wide, ½ ton capacity buckets. These buckets carry the coal to a hopper at top of the unloader, from which it is conveyed by a 60″ wide belt to the surge bins.

The unloader removes the coal so completely that clean-up is not needed in the barge at any time.

When being unloaded the coal barge is protected from drifting by snubbing lines and barge positioners. The independent movement of the positioners enables the operator to keep the barge in precisely the right position at all times. The positioners are also used to push the barge away from the dock after unloading.

All movements of the barge and bucket elevator unloader are finger-tip controlled by one man. This man, located in a glass enclosed cab, has clear vision of all operations of barge movement and unloading.

Heyl & Patterson is now building a similar Coal Barge Unloader and Handling System of greater capacity for Jones & Laughlin Steel Corporation's Coal Preparation Plant at East Fredericktown, Pa.

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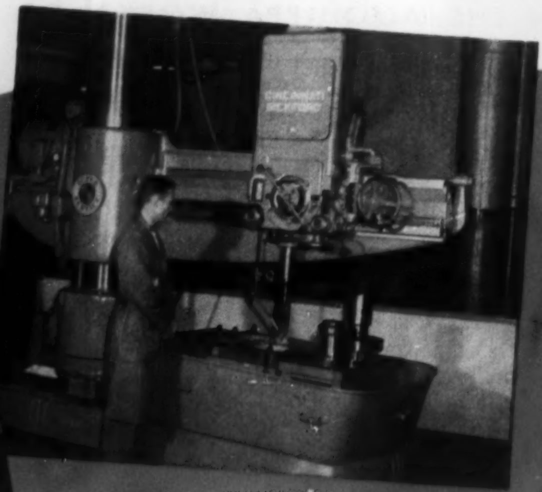
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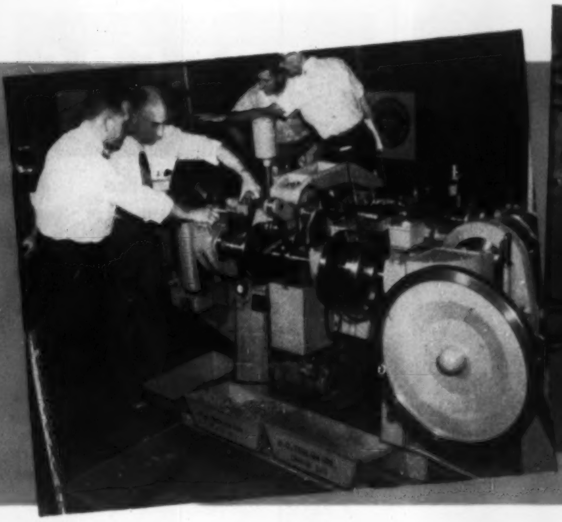

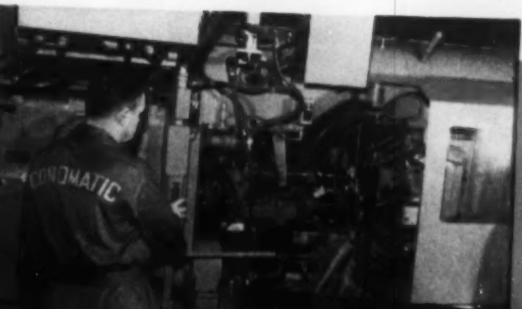

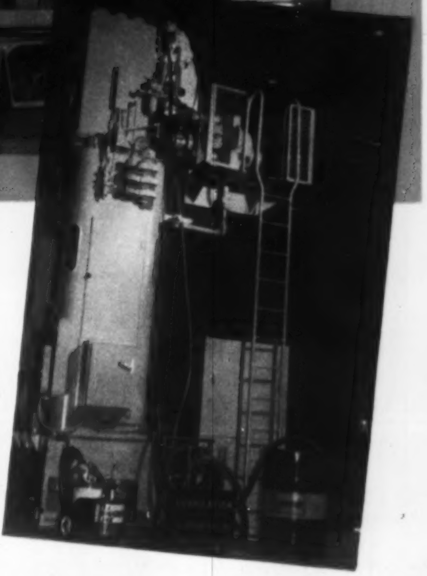

90 MANUFACTURERS OF MACHINE TOOLS exhibiting at the recent show in Chicago used *Houghton* lubricants, greases, coolants, cleaners or rust preventives to make sure their equipment gave the *best performance possible* before their 100,000-man audience!

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LETTERS
TO THE EDITORS

Fine Information Source

Please forward 2 copies of "Heat Treating Gray Iron", Part I (Oct. 24, page 118). This is a source of fine information and your organization is to be commended for the fine job.

John D. Gamble
Bell & Gossett Co.
Morton Grove, Ill.

Vacuum Melting Ups Strength

The article, "Vacuum Melting Leaves Lab" (Oct. 17, page 78), states that a user of vacuum processed high chromium stainless steel alloy finds impact strength has increased 50 to 1 over the air melted alloy.

I would be interested in obtaining further information on this material, including details on conditions under which this improved performance was obtained, effect of vacuum melting upon resistance to wear, availability of materials in sheet or strip form suitable for blanking, approximate price and available suppliers.

G. K. Burns
Engineer of Product Research
Teletype Corp.
Chicago

• *Write: Consolidated Vacuum Corp., 1775 Mount Read Blvd., Rochester 3, N. Y. Donald C. Deyle is public relations manager.*

Car Parts Not Strong Enough

In the Mirrors of Motordom column of Oct. 17 (page 87), the author talks about the overengineering of automobile parts. He asserts that many, many parts are too good, too strong, too expensive . . . and that there is a trend toward reduction of costs.

I believe most accidents are driver-caused, but many accidents may be caused by failures of the mechanisms.

I have had experience with two new cars. In one, the brakes failed two times and it had only been driven 1430 miles. I could not drive the second car (costing over $3000) for a month, until the dealer installed a new carburetor. Recently I noticed the car braking to the right side of the road and the dealer does not know how to fix it. There are also other failures.

In the article, a metallurgist is quoted as saying: "We used to spend most of our time handling service failures . . . Now we seldom get a part which has failed in service; if we do, almost invariably it is one which did not meet our specifications and we send the problem back to manufacturing."

But what about the owner of a car in

(Please turn to page 12)

Morgan cranes stop "on a dime"

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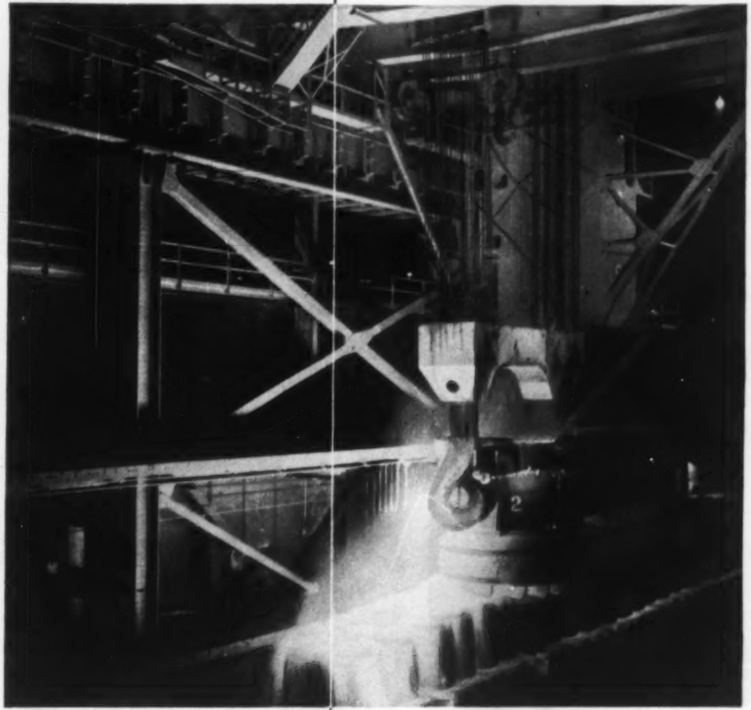
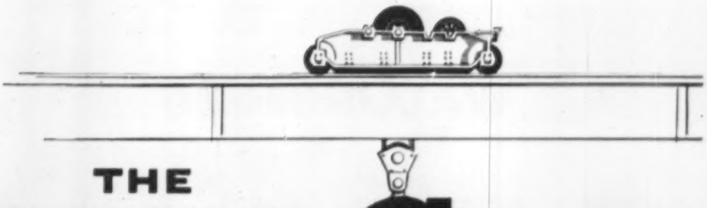
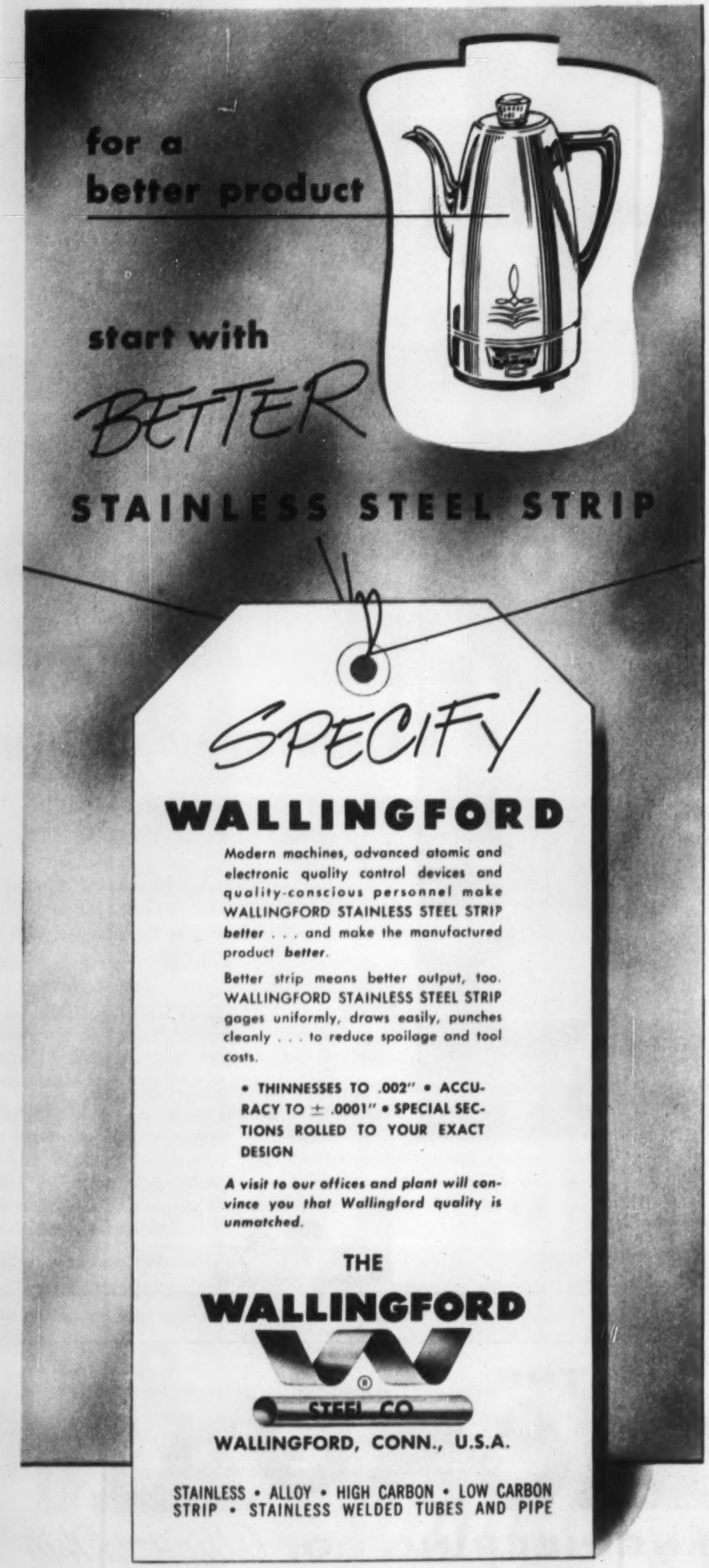


Positive action encourages operators to use the hydraulic brake rather than plug the motor.



The Morgan Engineering Company, founded in 1868, manufactures overhead electric traveling cranes, gantry cranes, charging machines, plate mills, blooming mills, structural mills, shears, saws, and auxiliary equipment.

THE MORGAN ENGINEERING CO. *Alliance, Ohio*



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Better strip means better output, too. WALLINGFORD STAINLESS STEEL STRIP gages uniformly, draws easily, punches cleanly . . . to reduce spoilage and tool costs.

- THINNESSES TO .002" • ACCURACY TO ± .0001" • SPECIAL SECTIONS ROLLED TO YOUR EXACT DESIGN

A visit to our offices and plant will convince you that Wallingford quality is unmatched.

THE WALLINGFORD STEEL CO

WALLINGFORD, CONN., U.S.A.

STAINLESS • ALLOY • HIGH CARBON • LOW CARBON STRIP • STAINLESS WELDED TUBES AND PIPE

LETTERS

(Concluded from page 10)

which the part failed? If he killed himself or someone else, it is no consolation for the victim that the engineering department was right and the manufacturing plant wrong. The buyer should get a good car in all cases.

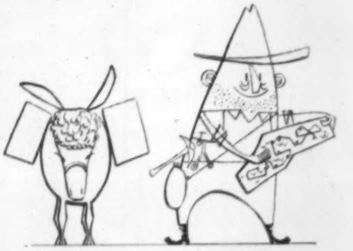
Since we cannot calculate the stress we have to deal with in an emergency, we should have a high security factor on vital parts. I have examined thousands of car parts both in Europe and this country. Most of the failures were caused by fatigue fractures. That means all cars are built very close to a minimum, and the minimum is all right for excellent roads only.

Safety belts and "push-button" transmissions are new things; they have nothing to do with real safety. It depends on the chassis, frame, and brakes with a dependable hydraulic system.

Car owners should realize that changes every year, just for the sake of changing, does not mean cars are better. They are just different.

John Obrebski
Chief Metallurgist
Monarch Machine Tool Co.
Sidney, O.

Map Aids Search



Your article, "Market Facts" (Oct. 24, page 91), is very interesting and valuable. It is of special interest to us at the present time. We are planning to expand our marketing department and are searching for useful sources of data in addition to our own statistics.

May we have a copy of the map, "Metalworking Markets in the U. S."?

A. O. Berg
Manager, Marketing Dept.
Manning, Maxwell & Moore Inc.
Muskegon, Mich.

We are relatively new in the field of market research and have found your articles and magazine to be extremely informative and helpful to us in setting up our program. We would appreciate three copies of the article and the map.

E. H. Ogden
Application Engineer
Bearing Division
McGill Mfg. Co. Inc.
Valparaiso, Ind.

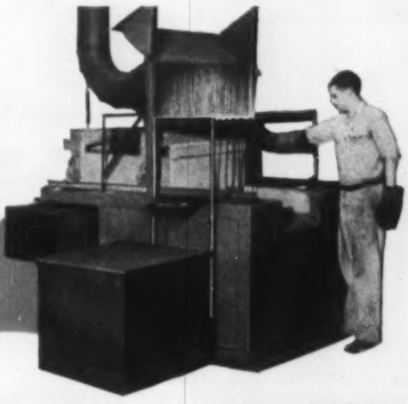
This article will prove an invaluable aid to all companies interested in market research. May I have 12 reprints.

E. A. Loth
Vice President-Mfg.
Pacific Pumps Inc.
Huntington Park, Calif.

Let me congratulate you on a fine job of pointing out a weakness in many organizations. My opinion is similar to the quote you have from Vergil D. Reed. I would appreciate a copy of the map.

Ed L. Kornowski
Industrial Consultant
9 Mapleton
Bedford, O.

FASTER, LOWER COST Hardening FOR ALL Engineering Steels



No Scale ... No Decarb

Full hardness with no decarburization (even under microscopic examination) of silicon-manganese steel gears is obtained by a machine tool producer in this Ajax salt bath installation.

No other device approaches Ajax neutral salt bath efficiency in hardening steels ... low carbon, high alloy, stainless, high-carbon high-chrome, high speed types ... *because only Ajax protects the work so effectively from atmospheric effects.*

All air is "sealed out." A film of salt protects the work up to the instant of quenching ... keeps the surface clean. Scaling, pitting, carburizing and decarburization are avoided.

LOW COST—First cost of equipment is only ½ to ⅕ that of any other production hardening system!

RAPID HEATING—Heating cycles from 4 to 6 times faster than in radiant type furnaces assure greater production in less time. Distortion is negligible.

UNIFORM RESULTS—*Uniform* physical properties result from *uniform* bath temperatures ... and, in the Ajax furnace, a temperature variation of less than 5°F is held throughout. Smaller equipment in less space produces a given output. Unskilled labor can handle the entire process.

ADAPTABILITY—Selective heating is easily obtained by immersing only that portion of the work to be hardened. A unique method for hardening gear or sprocket teeth is to spin them in salt, immersing only the teeth.

WRITE FOR **Ajax Catalog 116B, also list of documented case histories of hardening installations.**

SEND **your specimen parts to the Ajax Metallurgical Service Laboratory for treatment. No cost or obligation.**

Fast COMPLETELY MECHANIZED HARDENING

4-pound spline shafts loaded 4 shafts to a fixture, and up to 10 fixture loads at a time, are hardened at 1550°F. in a mechanized Ajax salt bath furnace. They are automatically quenched in water followed by a nitrate salt draw at 600°F. The Ajax furnace has operated day in and day out 24 hours a day for over a year without interruption.

5400 BLADES A Day

Good carving knives need exceptionally hard, tough cutting edges ... and these blades of 440 stainless steel have them! 150 lbs. of work per hour, or 5400 blades per day, are handled in a single Ajax salt bath furnace by one unskilled operator.

MORE WORK IN Less Space

Aircraft landing gears of SAE-4340 steel up to 62" long are hardened in Ajax salt bath furnaces by immersing them vertically in baths 75" deep. Over 800 pounds of work are processed per hour ... Great space savings afforded by treating pieces vertically. Austenitizing furnace, requires less than 70 square feet of space.

No Rejects

On a run of 30,000 rock bits hardened with Ajax salt bath furnaces, not one was rejected. Bit life was increased 4 to 5 times by comparison with a previous hardening method. Plain carbon steel rather than costly alloy steel is used ... 480 lbs. an hour are treated in a bath with working dimensions of only 36" x 11" x 36"! Hardness never varies more than 1 point from Rc52.

Trademark

AJAX

HULTGREN

electric SALT BATH furnaces

World's largest manufacturer of electric heat-treating furnaces exclusively

AJAX ELECTRIC COMPANY 952 Frankford Ave. Philadelphia 23, Pa.

Associate companies: Ajax Electric Furnace Corp.; Ajax Engineering Corp.; Ajax Electrothermic Corp.
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MORSE
ADDS NEW LINE
OF CARBIDE TOOLS
AMERICAN INDUSTRY SEES CARBIDE USES
DEALERS HAIL NEW DEVELOPMENT!

AGAIN...the Biggest News in the Cutting Tool Industry is brought to you by your Morse-Franchised Distributor

Read off the headlines Morse has made in the last few years! Hi-Helix End Mills . . . the Ambore Drill . . . Morse Electrolizing . . . new teletype-telegraph network to speed up service . . . then the sensational "Vectormatic" Ground Taps . . .

And now MORSE ADDS CARBIDE TOOLS . . . *to give you the most complete line of cutting tools ever offered under one name.*

This means that your Morse-Franchised Distributor is in a position to recommend the best and most economical cutting tool for every job in your plant . . . be it carbon, high speed or carbide. He's backed by Morse's years of experience in carbide tooling . . . and he's the one man who has the most in cutting tools. *Call him in today.*

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASSACHUSETTS
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Dallas, San Francisco

MORSE
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NOW . . . more than ever
MORSE
means
"THE MOST"
in cutting tools

YOUR
VICTOR
DISTRIBUTOR
can meet all your metal cutting needs

Whatever your particular cutting operations, there are Victor Hand and Power Hacksaws, Metal and Wood Cutting Band Saws and Hacksaw Frames to meet your specific requirements.

Every Victor distributor can give you prompt delivery of any metal cutting saw you want. His men are backed up by Victor factory experts who can show you the way to new speed and economy on production metal sawing operations.

Remember, no blade on the market will cut faster or last longer than the right Victor Blade – at the price you want!

And for top performance at a low price, use Victor "Moly"® High Speed Steel blades. Victor developed this high speed, heavily-alloyed steel blade of molybdenum. Remember, "Moly" High Speed blades outlast standard steel blades 10 to 1, cut as well as the *best* high speed steel blades made, but are substantially lower in cost.

VICTOR
MOLY
HIGH SPEED

Free!
Ask your Industrial Distributor for a supply of our NEW Metal Cutting Booklets and Wall Charts.

Sold Only Through Recognized Distributors

VICTOR 1880

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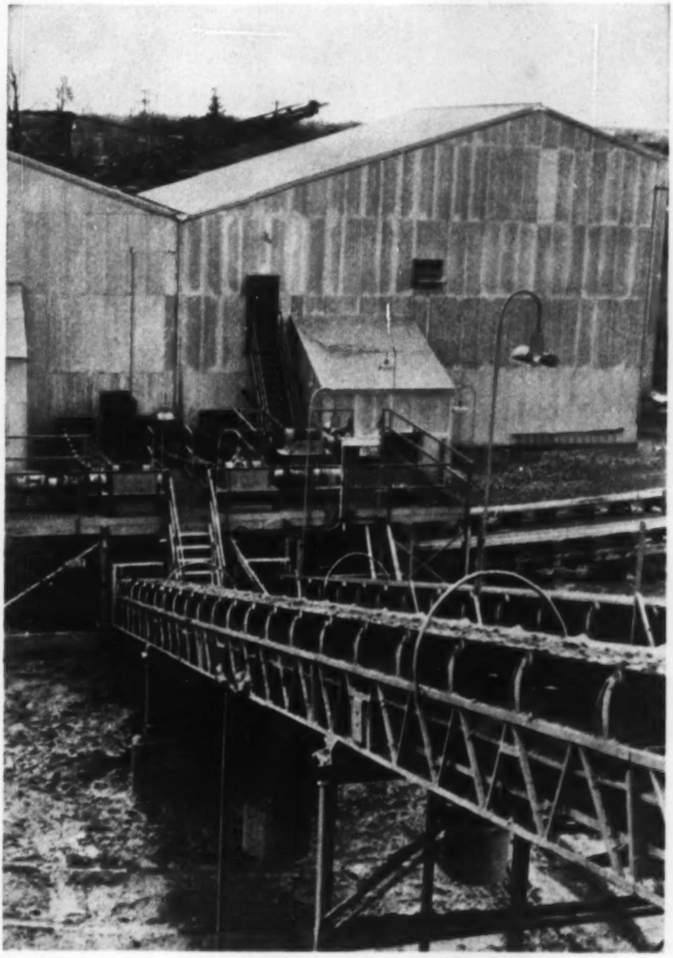
LOWER COST PER TON-MILE

. . . yours with either a Link-Belt single belt conveyor or complete system

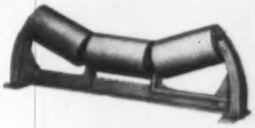
WHETHER you need a single belt conveyor or complete system, you'll find that Link-Belt engineering and equipment add up to lower cost per ton mile. Drawing from vast experience, our engineers can develop a system incorporating the most practical components from our complete line of quality idlers, trippers, drives, terminal machinery and other items. And if desired, we will handle erection.

Link-Belt has pioneered the development of belt conveyors for short or long hauls . . . indoor or outdoor service. To learn how this background can produce utmost economy per ton-mile in handling your bulk material, call your Link-Belt office.



Link-Belt 30-in. wide belt conveyors handling iron ore concentrate and tailings from washing plant to railroad and truck loading hoppers.

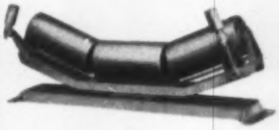
Troughed belt idlers



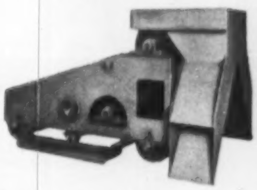
Troughed rubber cushion idlers

Return belt idlers

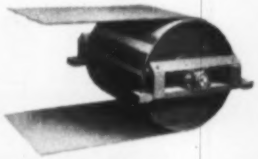
Troughed belt training idlers



Belt conveyor trippers



Terminal machinery

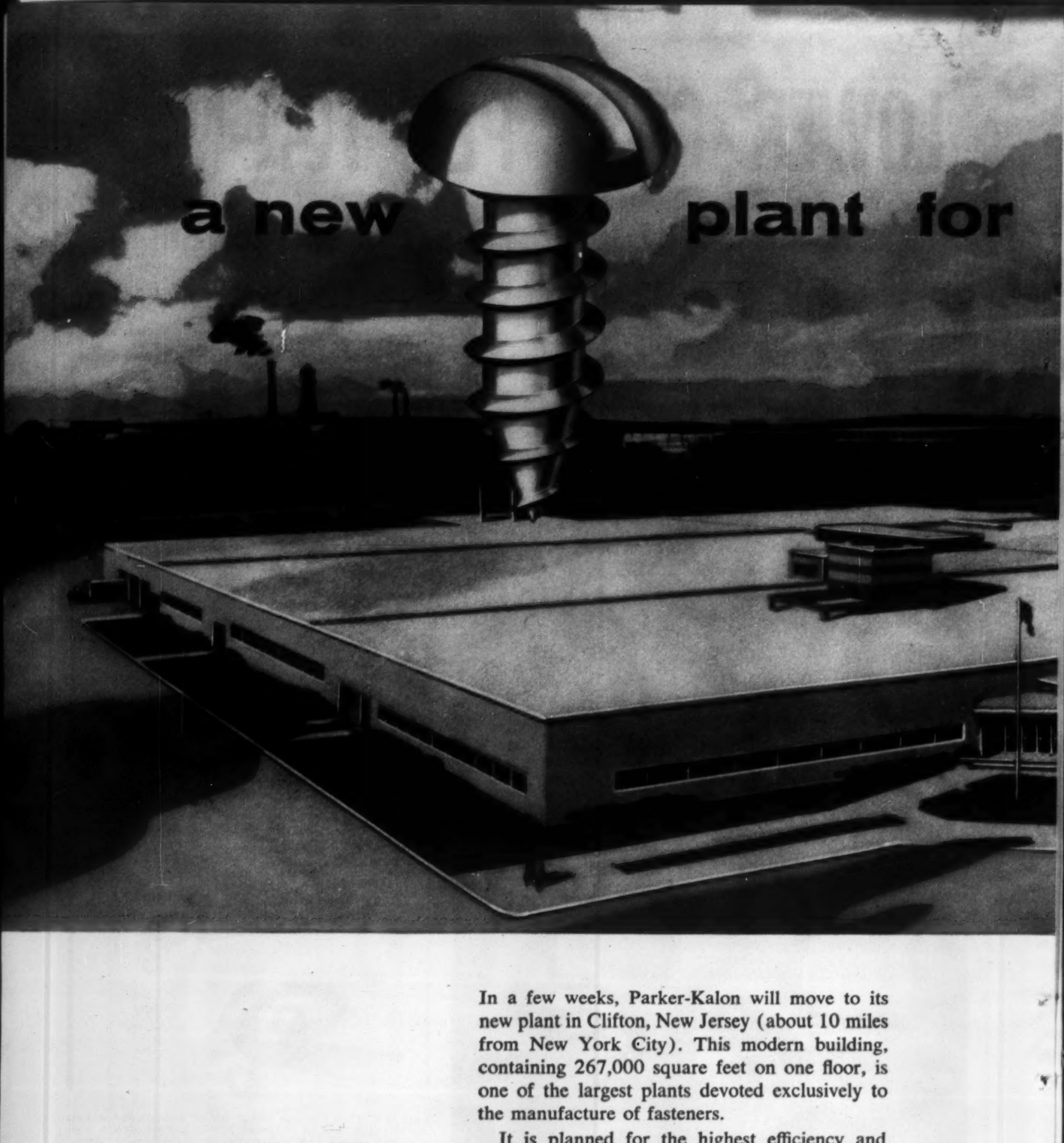


Link-Belt offers you one source for all equipment—including 500 idler sizes in 35 types . . . plus pulleys, drives, trippers and supports. Whatever the weight of loads, atmospheric factors or other operating conditions, you're assured of the easiest and most practical integration of belt conveyors into your overall system requirements.

LINK-BELT

BELT CONVEYOR EQUIPMENT

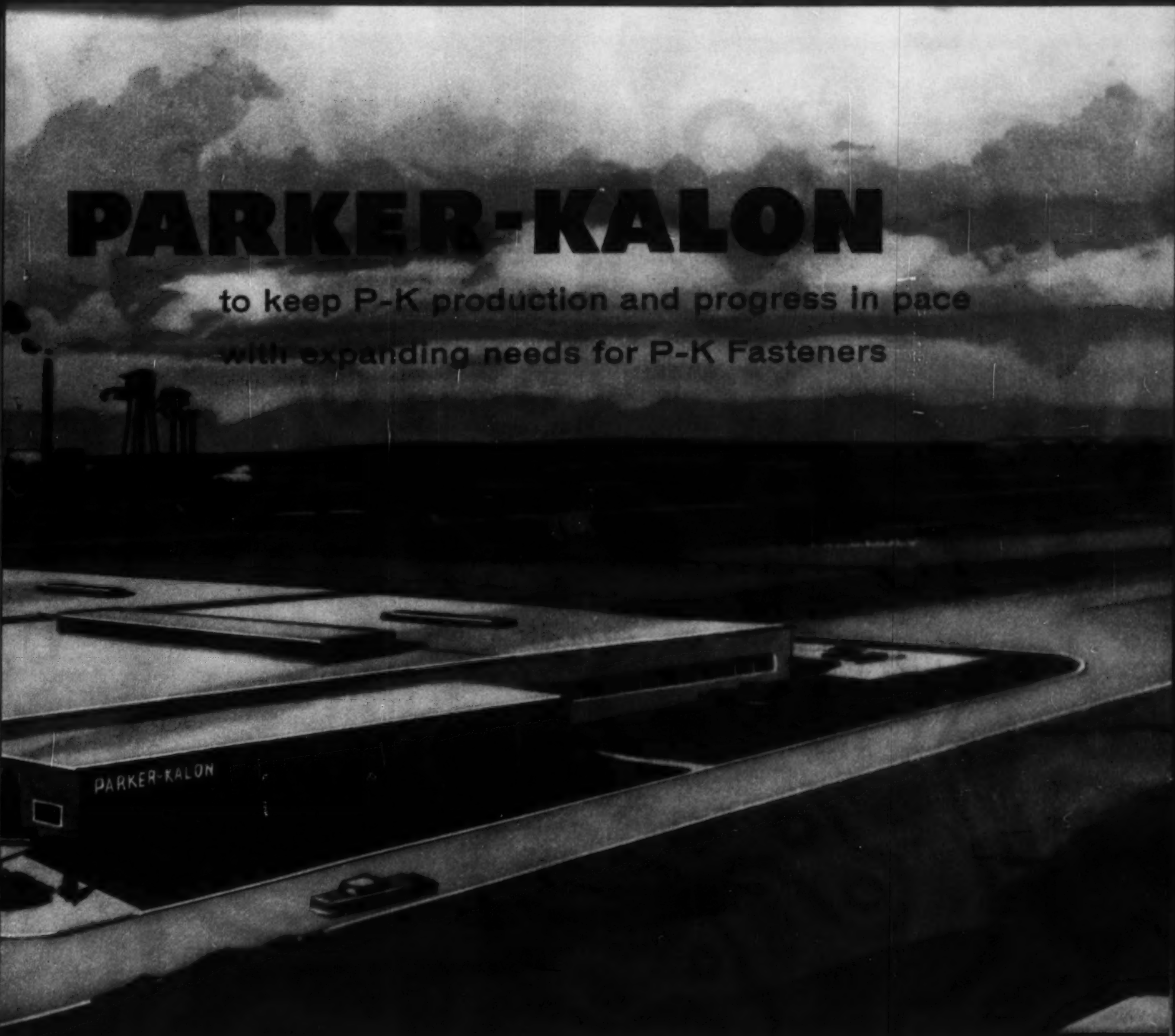
LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13,962



In a few weeks, Parker-Kalon will move to its new plant in Clifton, New Jersey (about 10 miles from New York City). This modern building, containing 267,000 square feet on one floor, is one of the largest plants devoted exclusively to the manufacture of fasteners.

It is planned for the highest efficiency and economy in all operations, with production keyed to the steadily increasing demand for P-K Fasteners throughout industry. Advanced facilities for engineering and research will accelerate P-K progress in development of new and improved fasteners.

Now, more than ever, you can be sure . . . "If it's P-K . . . it's O.K.!"


PARKER-KALON
to keep P-K production and progress in pace
with expanding needs for P-K Fasteners
PARKER-KALON

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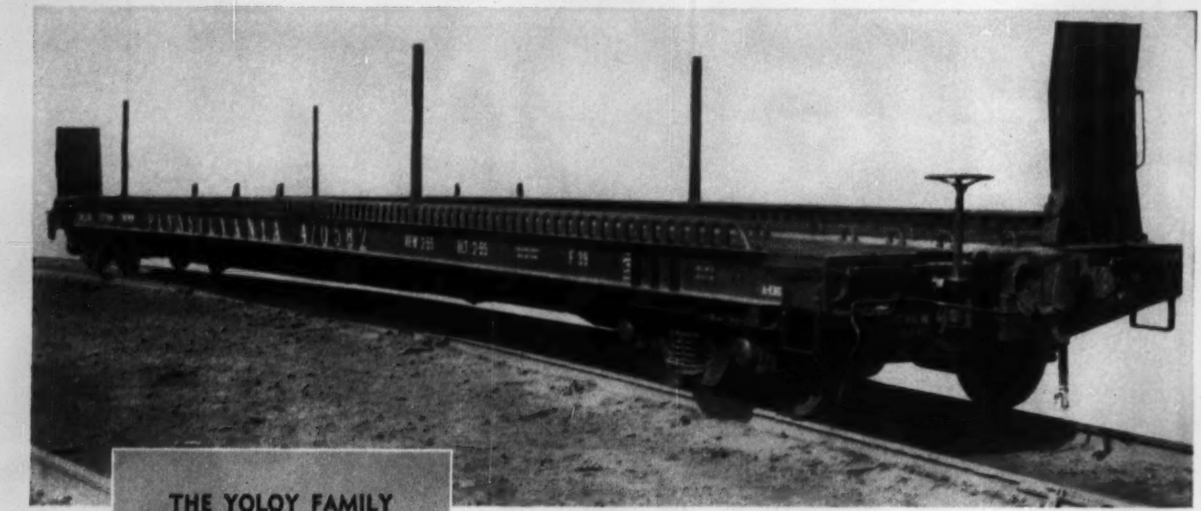
SELF-TAPPING SCREWS • STAPS • SOCKET SCREWS • SCREWNAILS • MASONRY NAILS • WING NUTS • THUMB SCREWS

Sold through leading Industrial Distributors.

YOLOY E

is backbone of

OPERATION "PIGGY-BACK"



THE YOLOY FAMILY

High in resistance to corrosion, shock and vibration, easy to fabricate, easy to weld.

YOLOY
(Nickel-Copper)
High Strength Low Alloy Steel

YOLOY E
(Nickel-Chrome-Copper)
High Strength Low Alloy Steel

These extra long specially equipped flat cars are the Pennsylvania Railroads new Truc-Train cars designed to haul two fully loaded highway trailers. To reduce dead weight, The Pennsylvania used Yoloy E steel to withstand the heavy concentrations of loads encountered in the long spans between truck center plates.

Yoloy E, The Youngstown Sheet and Tube Company's high strength low alloy steel is made to order for problems such as this. It has a high strength to weight ratio for stronger construction without increasing weight. It is easy to weld and fabricate. Yoloy E will also last many times longer than ordinary steel in atmospheric corrosion and is high in resistance to abrasion and wear.

There is a Yoloy steel to solve your construction problems—write or call your nearest District office for full details.

Youngstown

QUALITY
YOUNGSTOWN
SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

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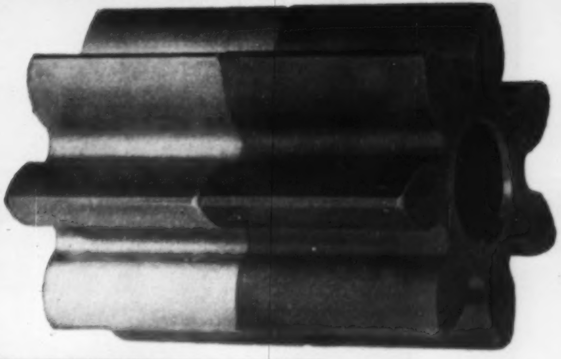
SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - BLACK PLATE - RAILROAD TRACK SPIKES - MINE ROOF BOLTS

This Month's
GEAR PIX

RECORD SETTERS are these Shear-Speed gear shapers shown in final stage of assembly. More and more of these machines that cut all teeth simultaneously in a gear or similar toothed part are helping to set today's production pace.

GEAR
SHEAR SPEED
SHAPER



CAST BLANK ON BOTTOM, steel blank on top, eliminates burrs when all teeth on both gears are cut simultaneously on Shear-Speed gear shapers. These mating automotive oil pump gears operate more smoothly due to close tolerances, smooth surface finishes, and perfectly formed 0.080-inch radii at the tooth fillets with no scallops or ridges. Three Shear-Speed gear shapers produce these gears for one of the best known automobiles.

**MICHIGAN
TOOL COMPANY**

7171 E. McNICHOLS RD. • DETROIT 12, MICH.
IN CANADA: COLONIAL TOOL CO., LTD.

DESIGN YOUR PARTS OF SPRING STEEL

LIGHT WEIGHT . . . LONG WEARING . . . STRONG

Wallace Barnes

Spring Steel

ANNEALED
TEMPERED

Meets every requirement for modern product design and fabrication. Excels in accuracy, ductility hardenability, finish, high fatigue value, and uniformity.

Wallace Barnes Steel Division

WALLACE BARNES COMPANY • Bristol, Conn.
DIVISION OF ASSOCIATED SPRING CORPORATION

CALENDAR
OF MEETINGS

Nov. 14-16, National Metal Trades Association: Annual convention, Commodore hotel, New York. Association's address: 122 S. Michigan Ave., Chicago 3, Ill. Secretary: Charles L. Blatchford.

Nov. 14-17, International Automation Exposition: Navy Pier, Chicago. Information: Richard Rimbach Associates Inc., 845 Ridge Ave., Pittsburgh 12, Pa.

Nov. 14-17, Wire Association: Annual meeting, LaSalle hotel, Chicago. Association's address: 453 Main St., Stamford, Conn. Secretary: Richard E. Brown.

Nov. 14-18, Chicago Exposition of Power & Mechanical Engineering: Chicago Coliseum, Chicago. Information: International Exposition Co., 480 Lexington Ave., New York 17, N. Y.

Nov. 14-18, National Electrical Manufacturers Association: Annual meeting, Traymore hotel, Atlantic City, N. J. Association's address: 155 E. 44th St., New York 17, N. Y. Managing director: Joseph F. Miller.

Nov. 16-18, Society for Experimental Stress Analysis: Annual meeting and exhibit, Sherman hotel, Chicago. Society's address: P. O. Box 168, Cambridge 39, Mass. Secretary-treasurer: W. M. Murray.

Nov. 27-30, American Institute of Chemical Engineers: Annual meeting, Hotel Statler, Detroit. Institute's address: 25 W. 45th St., New York 36, N. Y. Secretary: F. J. Van Antwerpen.

Nov. 27-Dec. 2, American Institute of Steel Construction Inc.: Annual meeting, Boca Raton hotel and club, Boca Raton, Fla. Institute's address: 101 Park Ave., New York 17, N. Y. Secretary: M. Harvey Smedley.

Nov. 28-Dec. 1, Air Conditioning & Refrigeration Exposition: Atlantic City Auditorium, Atlantic City, N. J. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Dec. 5-9, National Exposition of Chemical Industries: Commercial Museum and Convention Hall, Philadelphia. Information: International Exposition Co., 480 Lexington, Ave., New York 17, N. Y. Manager: E. K. Stevens.

Dec. 7-9, American Institute of Mining & Metallurgical Engineers: Electric furnace steel conference, William Penn hotel, Pittsburgh. Institute's address: 29 W. 39th St., New York, N. Y. Secretary: E. H. Robie.

Dec. 7-9, National Association of Manufacturers: Annual meeting and exhibit, Waldorf Astoria, New York. Association's address: 2 E. 48th St., New York, N. Y. Secretary: Noel Sargent.

Dec. 12-13, Material Handling Institute Inc.: Annual meeting, Hotel Statler, New York. Institute's address: One Gateway Center, Pittsburgh 22, Pa. Managing director: R. Kennedy Hanson.

Dec. 12-16, Atomic Exposition and Nuclear Engineering & Science Congress: Public Auditorium, Cleveland. Information: International Atomic Exposition, 931 Book Bldg., Detroit 26, Mich.

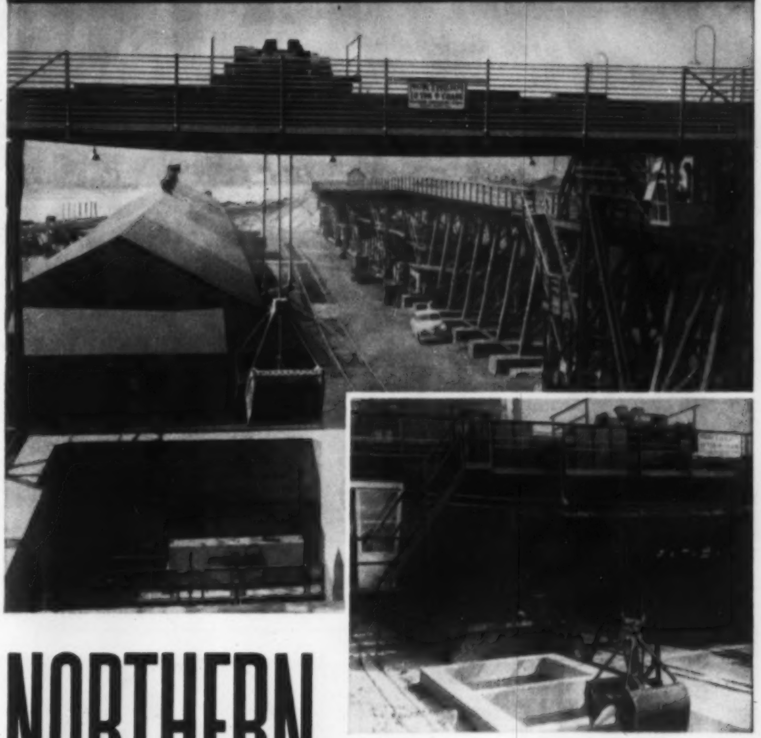
Dec. 13-15, Industrial Truck Association: Winter meeting. Hotel Statler, New York. Association's address: Washington Loan & Trust Bldg., Washington 4, D. C. Managing director: William Van C. Brandt.

Jan. 3-6, Institute of Scrap Iron & Steel Inc.: Annual meeting and exhibit, Sherman hotel, Chicago. Institute's address: 1729 H St. N.W., Washington 6, D. C. Executive vice president: E. C. Barringer.

Jan. 9-13, Society of Automotive Engineers Inc.: Annual meeting, Sheraton-Cadillac hotel and Hotel Statler, Detroit. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Jan. 11-14, American Road Builders' Association: Annual convention and exhibit, Municipal Auditorium, Miami Beach, Fla. Association's address: World Center Bldg., Washington 6, D. C. Executive vice president and secretary: Eugene Reybold.

Jan. 23-25, Truck-Trailer Manufacturers Association Inc.: Annual meeting, Edgewater Gulf hotel, Edgewater Park, Miss. Association's address: 710 Albee Bldg., Washington 5, D. C. Managing director: John B. Hulse.



Look Overhead . . . see "NORTHERN"

NORTHERN YARD CRANES

are built for rugged service

All Northern Overhead Electric Traveling Cranes are designed and built to provide the maximum in dependable operation under the most rugged conditions.

High efficiency and minimum maintenance are assured by close tolerance machining of all mechanical parts with turned and ground shafts, press fits of gears, wheels and bearings. Brakes are chosen to allow for extreme overload conditions. Extra heavy structural sections and rigid construction of girders with end trucks insure lateral stiffness, minimum vertical deflection and safe operation when the crane travels at full speed. Heavy duty type motors with anti-friction bearings are combined with especially selected control equipment to assure fine handling.

In plants where bulk material handling is required, as in the steel plant shown above, Northern cranes are a preferred investment for safety, dependability and efficiency.

Write for Bulletin SE-108

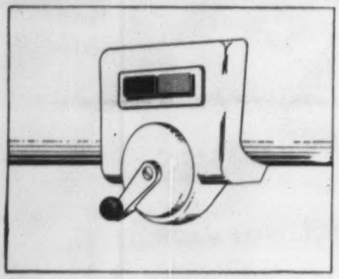
MATERIAL HANDLING EQUIPMENT BY NORTHERN

NORTHERN ENGINEERING WORKS
210 CHENE ST., DETROIT 7, MICH.

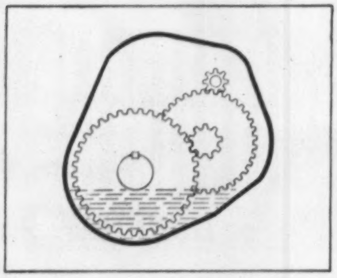
2 New CINCINNATI PRESS BRAKES

THIRTY TON - - - - 2-30 SERIES
FIFTY TON - - - - 3-50 SERIES

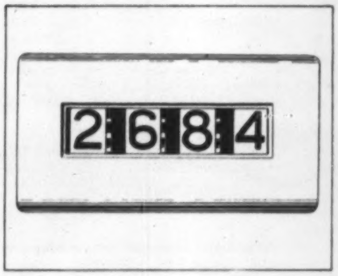
COMPETITIVELY PRICED



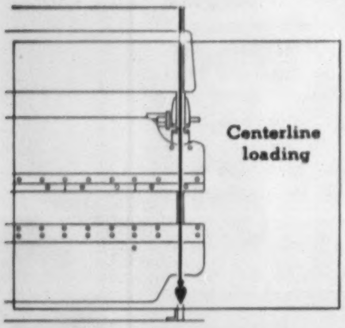
Front controlled, variable speed drive, 20 to 50 strokes per minute.



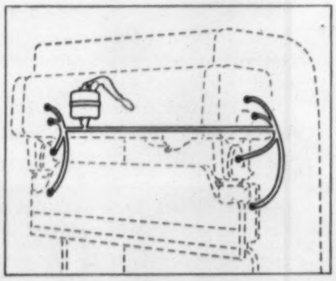
Completely enclosed transmission, running in oil.



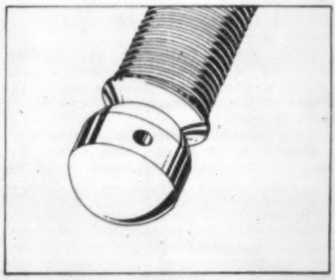
Two micrometer indicators, one at each end of the ram—easy to read and accurately record the amount of adjustment and tilt.



Centerline loading prevents weaving of the housings and insures accurate bends.



Centralized pressure lubrication system.



Ball end on the ram adjusting screws permits tapering of the ram for fade-out work.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

2-30 SERIES

This new 2-30 Series Cincinnati All Steel Press Brake has a capacity of 14 gauge x 6′ mild steel.

Look at these unusual standard features:

2½″ stroke—12″ shut height—9″ throat.

Distance between housings 5′-2″—overall die surface, 6′-0″.

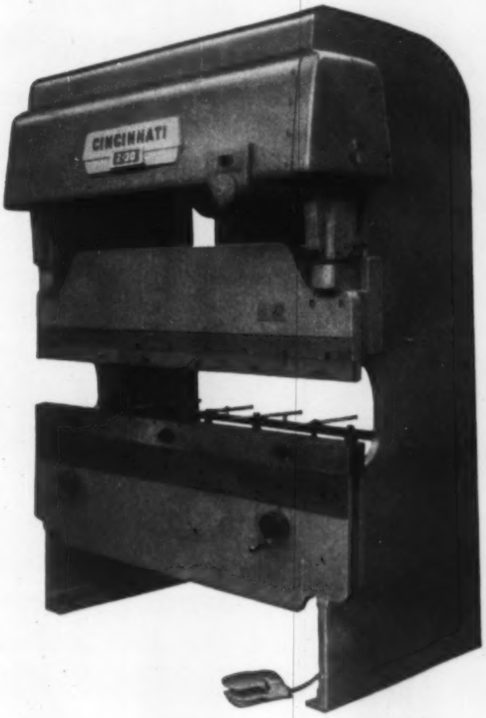
Front controlled, variable speed drive, 20 to 50 SPM. 4″ manual ram adjustment including ram tapering adjustment for fade-out work (power adjustment available as extra feature).

Bronze swivel end-guide bearing for accurate endwise alignment, even when tilting ram.

Brushless electro-magnetic brake and clutch.

Deep bed and ram, planed and drilled for 5¾″ angles.

Micrometer indicators on both ends of ram for fast, accurate setting.



3-50 SERIES

These new 3-50 Series Cincinnati All Steel Press Brakes are built in two lengths and have a capacity of 10 gauge x 6′ mild steel. Investigate these unusual standard features: 3″ stroke—12″ shut height—12″ throat—distance between housings 6′-6″ or 10′-6″—overall die surface 8′-0″ or 12′-0″—front controlled, variable speed drive, 20 to 50 SPM.

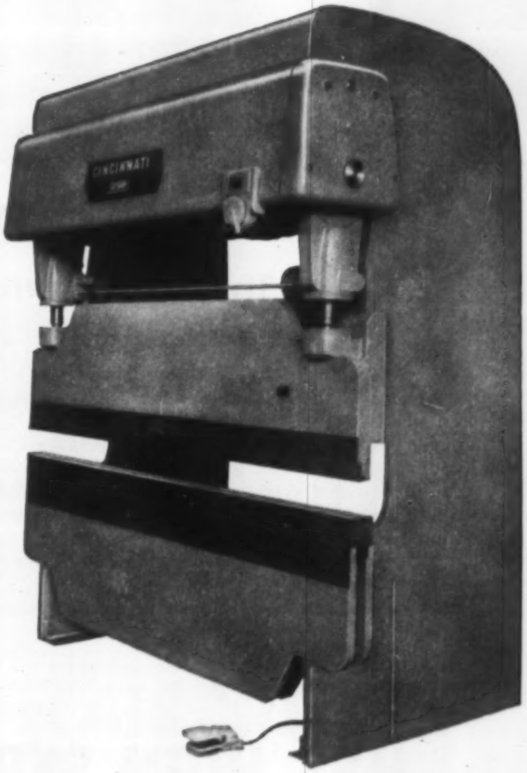
5″ motorized ram adjustment, including ram motor and control, complete with ram tapering adjustment for fade-out work.

Bronze swivel end-guide bearing for accurate endwise alignment, even when tilting ram.

Brushless electro-magnetic brake and clutch.

Deep bed and ram, planed and drilled for 5¾″ angles.

Micrometer indicators on both ends of ram for fast, accurate setting.



COMPRESSION

62

This condition of variable stress can be replaced by effective widths of plate which cooperate with each stiffener and are subjected to the same stress as the stiffener, as determined in the previous section of this text. The combination is then treated as a column, the radius of gyration of which is that about an axis parallel to the plate.

FIG. 19
STIFFENED FLAT PLATE IN EDGE COMPRESSION

You'll find it all here . . .

The information you need when designing for high strength steels

Our new "Design Manual for High Strength Steels" is ready for distribution. Here are 174 pages of practical, authoritative information that you will find invaluable in designing your product for greater economy and efficiency by the sound use of high strength steels. No designer should be without it.

This excellent book covers in detail the problems of tension, compression, shear, beam stress, deformation and deflection. It fully describes the fundamental characteristics of low-alloy high strength steels, shows you how to design against corrosion, describes the application of formed sections. Complete with tables, formulas, and basic data covering this important field of design.

• • •

For your free copy, write on your company letterhead giving your title or department, to United States Steel Corporation, Room 5020, 525 William Penn Place, Pittsburgh 30, Pa.

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USS HIGH STRENGTH STEELS

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UNITED STATES STEEL

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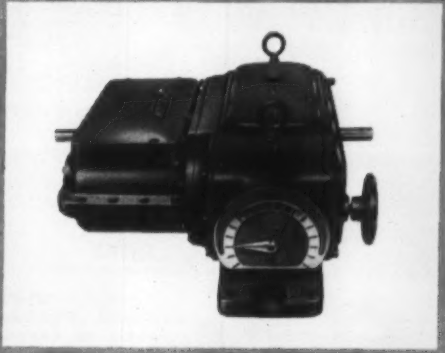
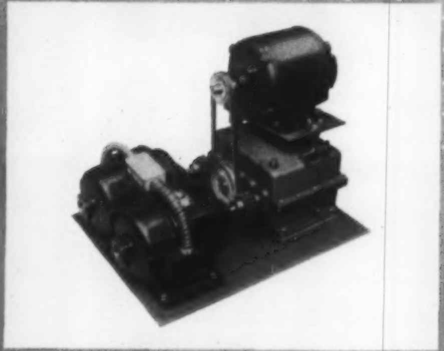
PRODUCTS SOLVE TEXTILE DRIVE PROBLEMS

Improved production and quality control in blender, napper, padder, tentering frame and slasher operations.

OUTSTANDING FEATURES

- Wide speed range including zero and reverse
- Maximum efficiency and power utilization
- Full torque at zero speed
- Instantaneous response to control signals
- Control simplicity
- Service-free dependability





For precision of speed and tension control specify Fairchild Specon products. These compact units provide improved production without the need for costly complex controls. Specon variable speed characteristics enable you to adjust easily for variations in material, build up, shrinkage, gauge differences and moisture content. Highly adaptable, Specon perfected tension control can be tailored to your specifications.

A basic adjunct to today's automated methods, Specon has been adopted by leading American manufacturers. It is available in *Electrical Differential* and *Mechanical Differential* models. Both units, by means of a uniquely designed bevel gear differential, effect optimum speed control through wide ranges *including zero and reverse*. Where extremely close control is required within a narrow speed band, Specon Mechanical Draw transmissions will maintain accuracies of speeds and settings not previously available to industry.

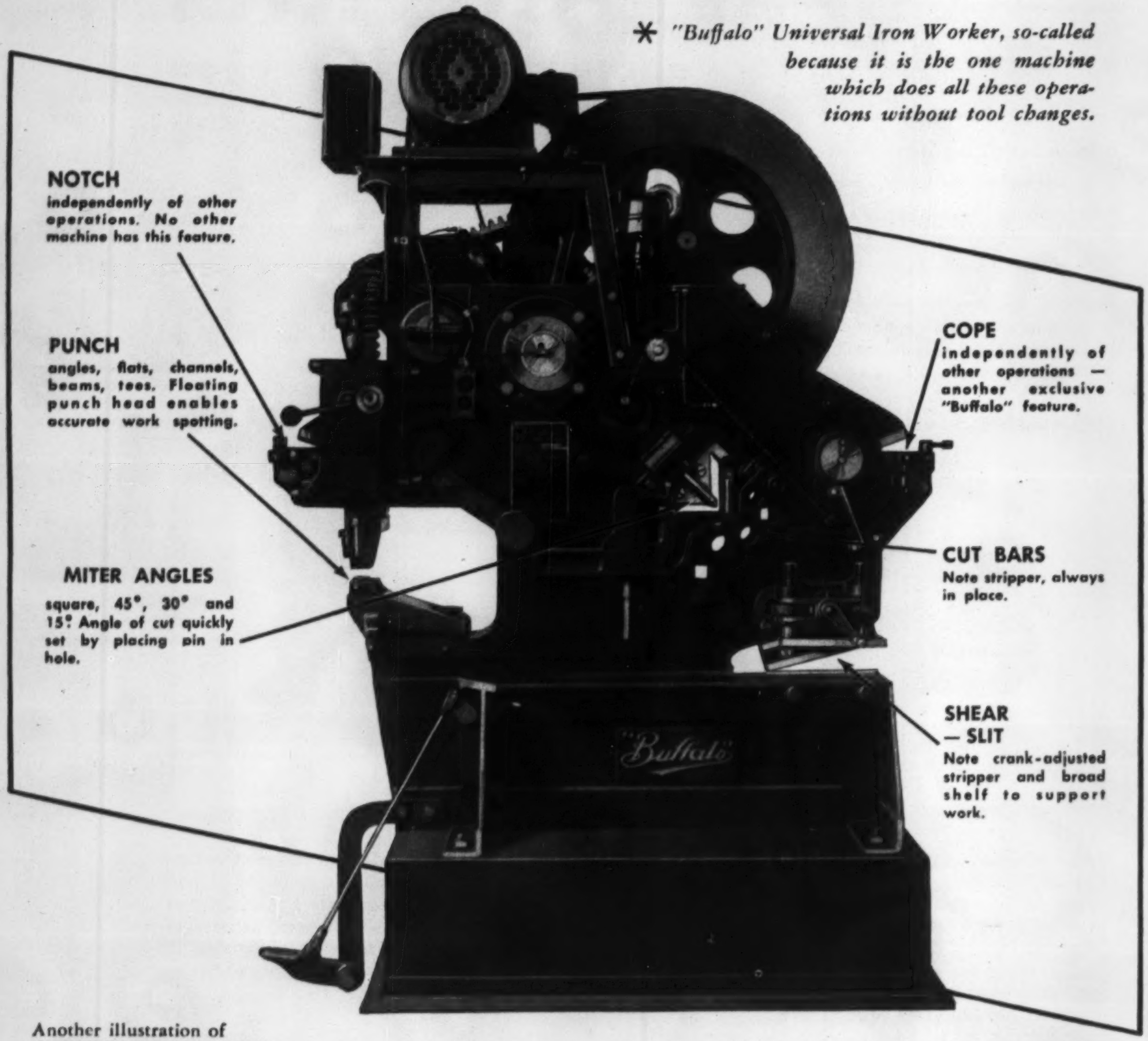
Backed by the technical resources and know-how of aviation's pace-making Fairchild Engine and Airplane Corporation, the Speed Control Division offers advanced engineering in variable speed application. Speed Control will be pleased to analyze your drive problem. Write today to Dept. T.

ENGINE AND AIRPLANE CORPORATION
FAIRCHILD
Speed Control Division
St. Augustine, Florida

Aircraft Division, Hagerstown, Maryland • American Helicopter Division, Manhattan Beach, Calif. • Engine Division, Deer Park, L. I., N. Y. • Guided Missiles Division, Wyandanch, N. Y. • Kinetics Division, New York, N. Y. • Stratos Division, Bay Shore, N. Y.

YOU CAN DO MORE JOBS IN LESS TIME — WITH A U.I.W.*

* *"Buffalo" Universal Iron Worker, so-called because it is the one machine which does all these operations without tool changes.*


NOTCH
independently of other operations. No other machine has this feature.
PUNCH
angles, flats, channels, beams, tees. Floating punch head enables accurate work spotting.
MITER ANGLES
square, 45°, 30° and 15°. Angle of cut quickly set by placing pin in hole.
COPE
independently of other operations — another exclusive "Buffalo" feature.
CUT BARS
Note stripper, always in place.
SHEAR — SLIT
Note crank-adjusted stripper and broad shelf to support work.
"Buffalo"

Another illustration of the "Q" Factor in "Buffalo" machines—*the built-in Quality which provides trouble-free satisfaction and long life.*

A Universal Iron Worker will save space — time — excessive conveying of work from machine to machine in your shop — because it does so many jobs. Often called the "most useful machine in the shop". For complete details, write for Bulletin 360.

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

BUFFALO FORGE COMPANY

158 MORTIMER STREET BUFFALO, NEW YORK
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING • PUNCHING • SHEARING BENDING

How forged weldless rings and flanges...
improve your product and cut your costs
Standard Steel Works Division
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BLH
BALDWIN-LIMA-HAMILTON

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"How forged weldless rings and flanges improve your product and cut your costs"

Standard Steel Works Division
BALDWIN-LIMA-HAMILTON

When you consider a change in your product, you expect that change to make money for you or to save money for you.

It's quite possible that Standard Steel Forged Weldless Rings and Flanges will do *both*.

They improve your product, thus making your sales task a little easier, and they cut your manufacturing costs. In many cases, first cost may be less than the component you now use, and always machining time is less.

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MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

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MANUFACTURING AND MEASUREMENT FOR MANKIND

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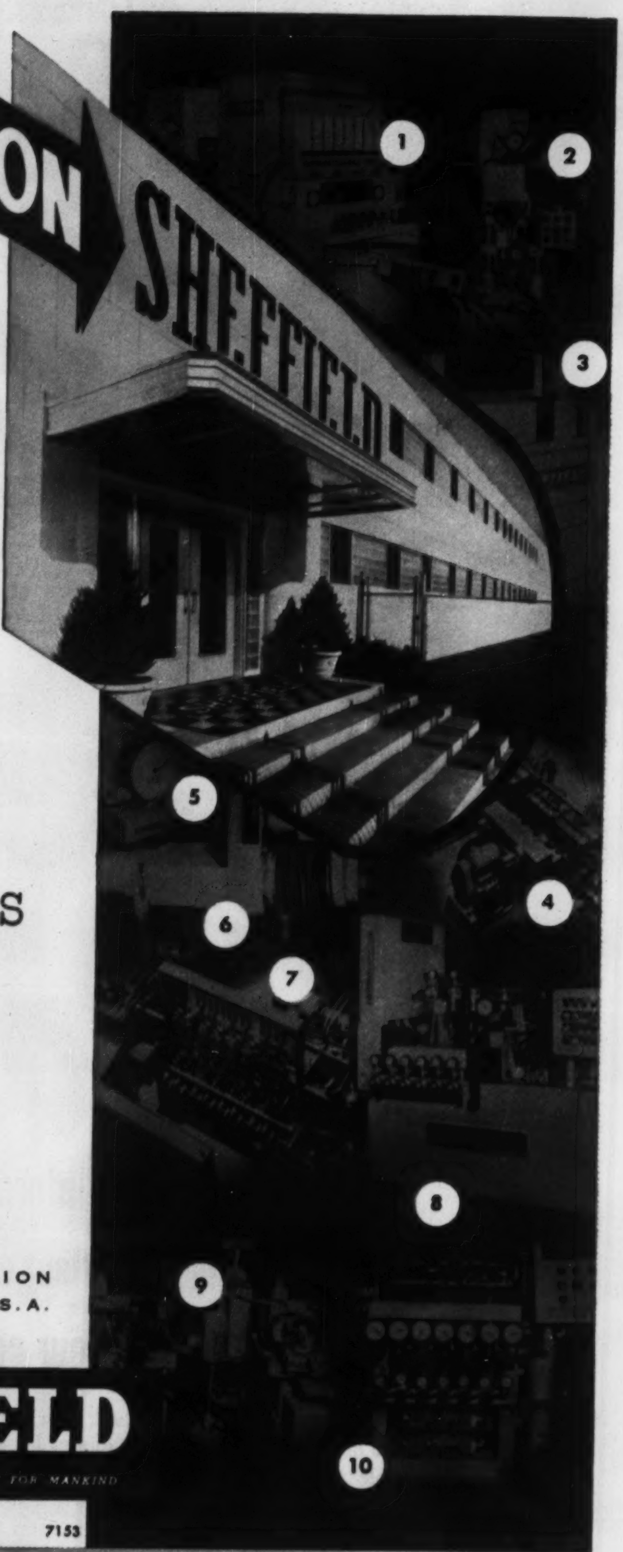

① Gaging cylinder bores for selective assembly
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③ Automatic gage for 100% inspection of small arms ammunition
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⑧ Controlling 12 grinding machines
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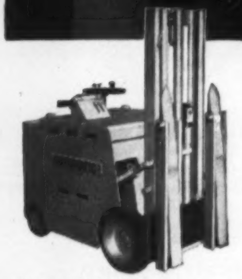
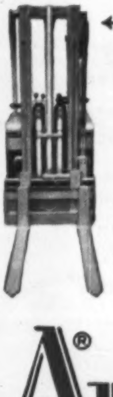
Leads The Field The First Year!



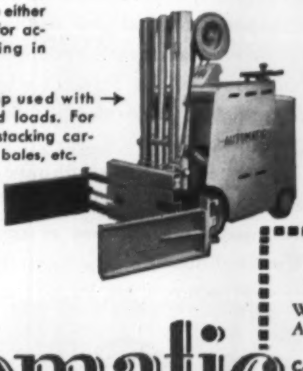
Hinged forks for convenience in adding attachments. Reduces overall length for transportation in elevators.

Paper roll clamp handles wide range of roll sizes. With rotating carriage up to 360°.



← Hydraulic side-shifter moves loads to either side of truck for accurate stacking in box cars, etc.

Carton clamp used with → nonpalletized loads. For moving and stacking cartons, crates, bales, etc.



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From the first—only a year ago—the DOCKER'S outstanding superiority assured it universal acceptance in industry. It was and is unrivalled in compactness, maneuverability and in such details as shortest overall length—lowest step height—fastest lift—highest grade clearance—shortest turning radius. Shown on the left are four of the special attachments which make the DOCKER the most versatile of lift trucks. There are many more. Why not find out what the DOCKER can do for you.

Available in Mono-lift or Duo-lift
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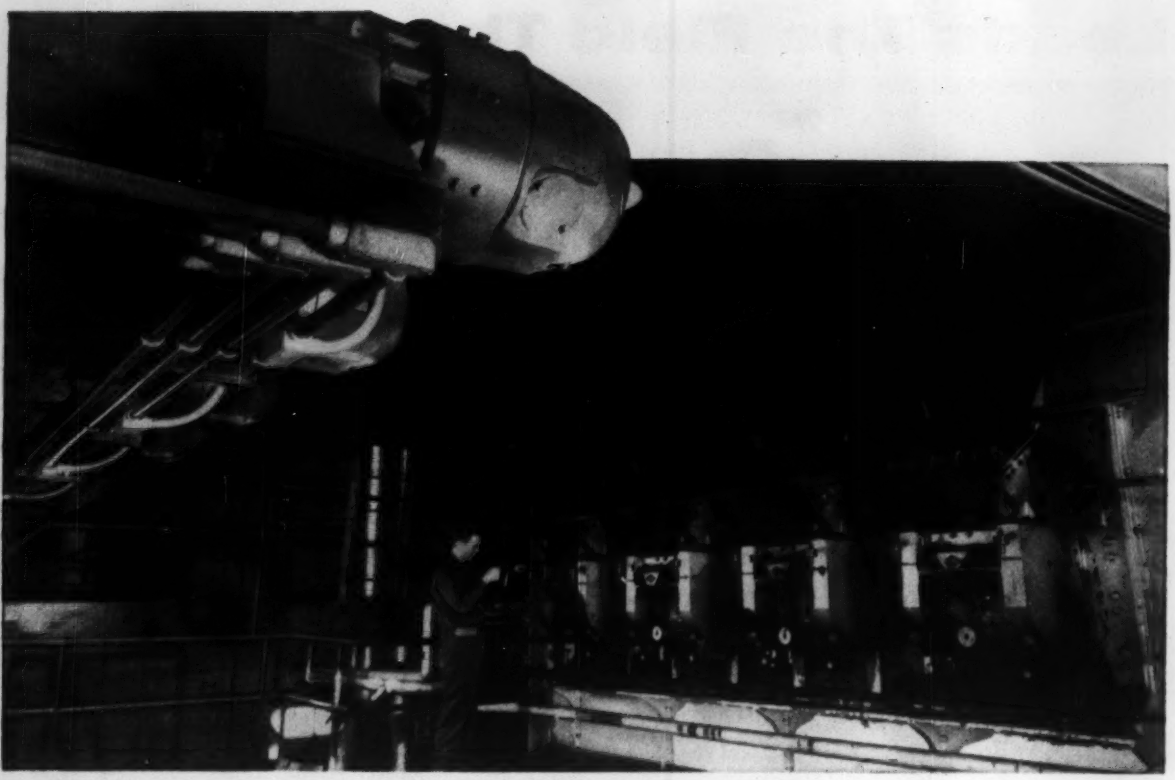
Automatic®

WORLD'S LARGEST EXCLUSIVE BUILDER OF ELECTRIC-DRIVEN INDUSTRIAL TRUCKS



Drive mounting problems erased with Westinghouse *Life-Line** Gearmotors

Putting the best drive in the minimum space is a problem constantly facing design engineers. In answer to this problem, Westinghouse Life-Line Gearmotors provide unit compactness, rugged construction and job-proved efficiency.

Westinghouse Life-Line Gearmotors have both motor and gears designed as an integral unit. As a result, there's a major saving in space because all belts, chains and pulleys can be eliminated. This means no alignment problems. Since integral design lessens the number of wearing parts, over-all maintenance is cut to a minimum.

With split-case gearmotors, there's no need to allow large work areas for removal or dismantling—all servicing can be done with the gearmotor "on the job". Split-case construction permits the gear cover to be removed in minutes and makes all working parts readily accessible. Any servicing, therefore, becomes a simple, speedy operation.

Taper-hardened gear teeth, thorough lubrication and industry-tested Life-Line Motors are but a few of the features which assure long, dependable performance from Westinghouse Gearmotors.

Your local Westinghouse Representative will gladly furnish you with additional information. Call him at any time or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

*Trade-Mark J-07322

YOU CAN BE *SURE*...IF IT'S
Westinghouse

steel from HAWKRIDGE . . .

vital element in this Lewis-Shepard JackStacker's remote control brakes

Every time the brakes are applied on this L-S Platform JackStacker, either from the normal operator's position or from the unique remote drive position on the platform, this cam made from steel supplied by HAWKRIDGE has a vital function. Hundreds of times during the working day, it actuates the brake shoes. And to insure its long life, and the extra dependability required of every Lewis-Shepard part, HAWKRIDGE engineers also aided in specifying the heat treatment that hardens it. This is another example of the way New England industries use metals and metal products from HAWKRIDGE's fully stocked warehouses. And there are good reasons why companies like Lewis-Shepard Products, Inc., depend on HAWKRIDGE as a source. Metals from HAWKRIDGE are *right* for the job. HAWKRIDGE's complete stock insures that orders are filled according to specifications. And strategic warehouse location insures *overnight delivery* to most points in New England.
So . . . whatever your needs . . . call the man from HAWKRIDGE today. He'll be glad to provide the *right* metal for your application. And, if you wish, he'll assist you with technical advice on your selection of metals for special uses.

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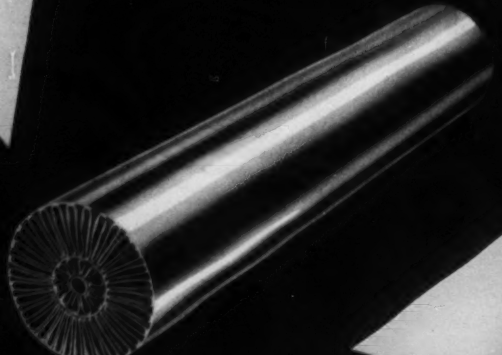


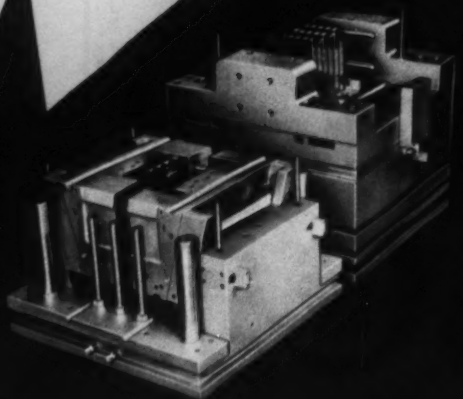
Longitudinal finned tubing for more efficient heat transfer with minimum pressure drop is made by The Heat-X-Changer Co., Inc., Brewster, N. Y., from cold rolled strip supplied by Hawkridge.

Applications unlimited ...with steel from Hawkridge

Whether you're making fork trucks or cigarette filters, plastic molding dies or finned tubing you'll find that HAWKRIDGE is your best source for steels. For HAWKRIDGE carries the most complete line of steel for the metal-working industries in New England.

In addition, you'll benefit from HAWKRIDGE's application engineering service . . . thoroughly trained and experienced steel men will assist you in selecting the right steel for your job.

Wherever you are in New England, write or phone HAWKRIDGE BROTHERS COMPANY for *all* your steel needs.



Power to form plastics calls for heavy-duty steel dies. Finish is critical so Guy P. Harvey & Son, Inc., Leominster, Mass., uses mirror-finish stainless supplied by Hawkridge. This 36" x 36" x 42", 3¼ ton die forms plastic storage battery cases.

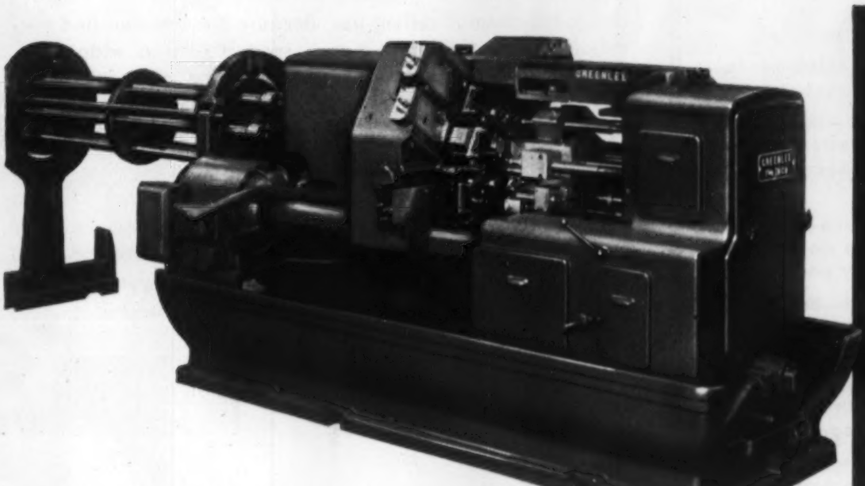
HAWKRIDGE BROTHERS COMPANY

BOSTON, MASS. . . . . WATERBURY, CONN.

Safer smoking is another Hawkridge application field. Already hundreds of thousands of this Aquafilter, made by Lakewood Metal Products, Inc., Waterbury, Conn., have been made from aluminum supplied by Hawkridge, and, in addition, the experimental tools that produced the first Aquafilter were made from Hawkridge tool steel.

now... greater accuracy, faster production

WITH GREENLEE SIX-SPINDLE AUTOMATICS



You can take advantage of new production techniques...attain higher levels of efficiency with the improved Greenlee 6-Spindle Bar Automatic. Its advanced design opens the door to some real profit opportunities. ● These design improvements are fully described in a catalog recently issued. Let us send you a copy today. Find out how Greenlee Automatics can save time and money in your plant. It will pay you to investigate.

IMPROVED SPINDLE CONSTRUCTION

The spindle has been completely redesigned to assure greater accuracy at higher speeds. True running... the new Greenlee spindle has five widely spaced, preloaded, angular-contact, precision ball bearings. Entire spindle is dynamically balanced for smooth operation. Metallic seals, labyrinth and friction washers with line contact provide maximum heat dissipation.

INCREASED SPEED

Spindle speed range has been increased. Enables you to take full advantage of the top efficiency and peak performance which carbide and high-speed tooling offer. Reduces downtime losses and tool costs.

Greenlee Automatic Bar Machines

WRITE FOR CATALOG No. A405

PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & CO.
1931 Mason Avenue
Rockford, Illinois

MICROHONING* . . . FACTS YOU SHOULD KNOW

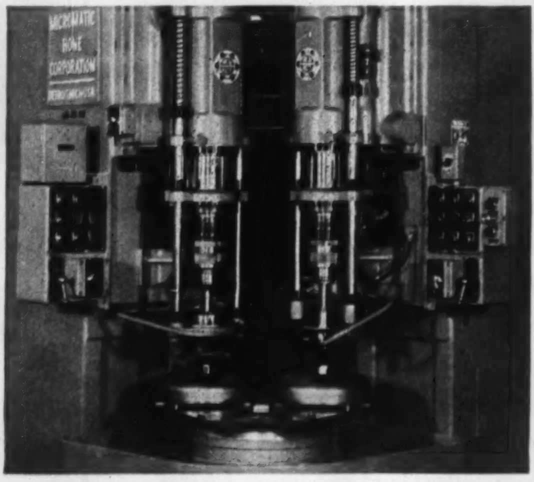
Compare These Microhoning Advantages

- **Rapid and efficient stock removal.**
- **Dimensional accuracy obtained in every part.**
- **Macrogeometric accuracy—the Microhoning action is not affected by vibration; long abrasive stones generate a true surface.**
- **Microgeometric accuracy—any desired surface finish and cross-hatch angle duplicated in every part.**
- **No concentration of heat—the structural surface of the part is undamaged.**
- **Microhoning applications include tapers, spheres, splines, tandem or interrupted bores, flat surfaces, and any type of material, regardless of hardness (or softness).**
- **No practical limitation on part length and diameter.**
- **No chip removal problem—the minute Microhoning chips are flushed away in the coolant and automatically removed.**
- **Automatic size control.**
- **Readily adapted to automation.**
- **Eliminates tool dressing time and cost.**
- **Location of bores is undisturbed.**
- **Float principle and low speeds assure minimum maintenance.**
- **Backed by over 26 years of engineering and service experience.**

PRECISION PRODUCTION THROUGH MICROHONING
MICRO MATIC
TRADE MARK

Microhoning is a low-velocity abrading process that employs thousands of small cutting tips. Because simultaneous and continuous cutting action of tips is spread over a wide area, stock is rapidly removed with a minimum of heating. This abrading technique generates functional surfaces ***by obtaining in one operation the required tolerances, specifications, or condition*** of the surface characteristics.

Included in these characteristics are: dimensional size (the distance between points or faces of a part, e.g., the diameter of a bore); macrogeometry (waves whose crests are more than $\frac{1}{32}$" apart); microgeometry (roughness or scratches whose crests are less than $\frac{1}{32}$" apart); and surface structure.



Microhoning . . . Example Application

Microhoning both I.D. and O.D. of the hub of a transmission torus cover to generate geometric accuracy and a surface finish of 10 microinches.

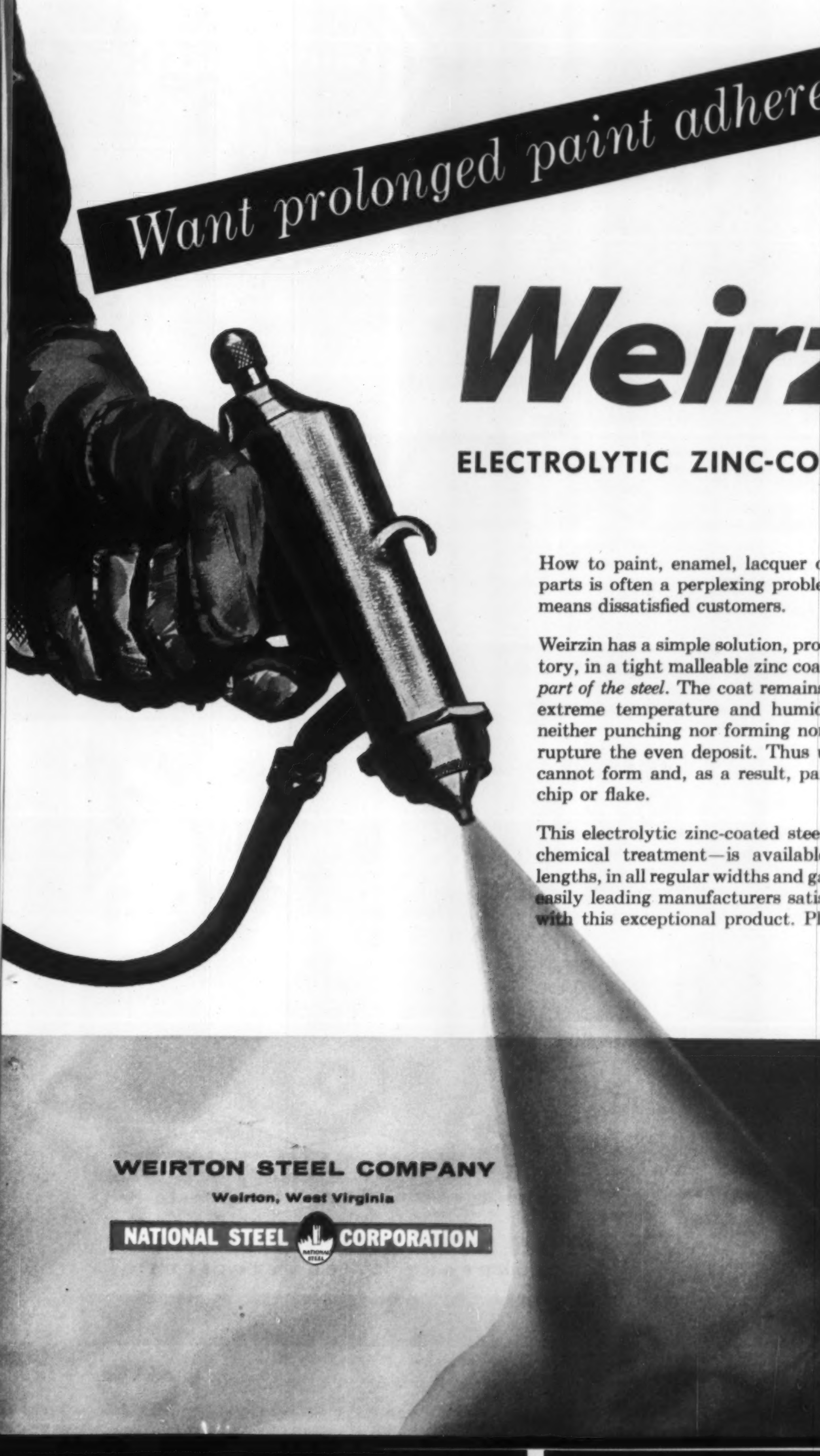
O.D.—*2.375", approx. 1" long, blind end*
I.D. —*2.125" x .280" long*
58-60 Rockwell "C"
Stock removal: *.001" to .002"*
Surface finish: *10 microinches*
Production: *180 per hour, gross.*

***MICROHONING = Stock Removal + Geometry + Size Control + Surface Finish**

Movies describing various machining processes and the generation of functional surfaces are available for group meetings. For literature or further information on films, write to:

MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN



Want prolonged paint adherence?

Weirzin

ELECTROLYTIC ZINC-COATED SHEET

How to paint, enamel, lacquer or lithograph metal parts is often a perplexing problem. Poor adherence means dissatisfied customers.

Weirzin has a simple solution, proved highly satisfactory, in a tight malleable zinc coating that is *actually part of the steel.* The coat remains intact even under extreme temperature and humidity. What's more, neither punching nor forming nor deep drawing can rupture the even deposit. Thus underfilm corrosion cannot form and, as a result, paint does not crack, chip or flake.

This electrolytic zinc-coated steel—with or without chemical treatment—is available in coils, in cut lengths, in all regular widths and gauges. Find out how easily leading manufacturers satisfy their customers with this exceptional product. Phone or write now.

WEIRTON STEEL COMPANY
Weirton, West Virginia
NATIONAL STEEL CORPORATION

WEIRTON STEEL COMPANY

EVOLUTION of MULT-AU-MATIC PROGRESS

Since 1914 the Bullard Mult-Au-Matic has reflected engineering and design progress required to fulfill industry's needs — until today, the Type "L", is the optimum for machines of its type.

Here are some of its features...

CONTROL SYSTEM

Advanced design of electro-hydraulic controls provide a readily accessible and simple control system for both Set-Up and Automatic machine operation.

FEED MECHANISM

Completely new screw type feed works insures smooth constant rate of advance of tool slides through any desired part of a 16" stroke with 81 feed changes ranging from .0025 to .0625.

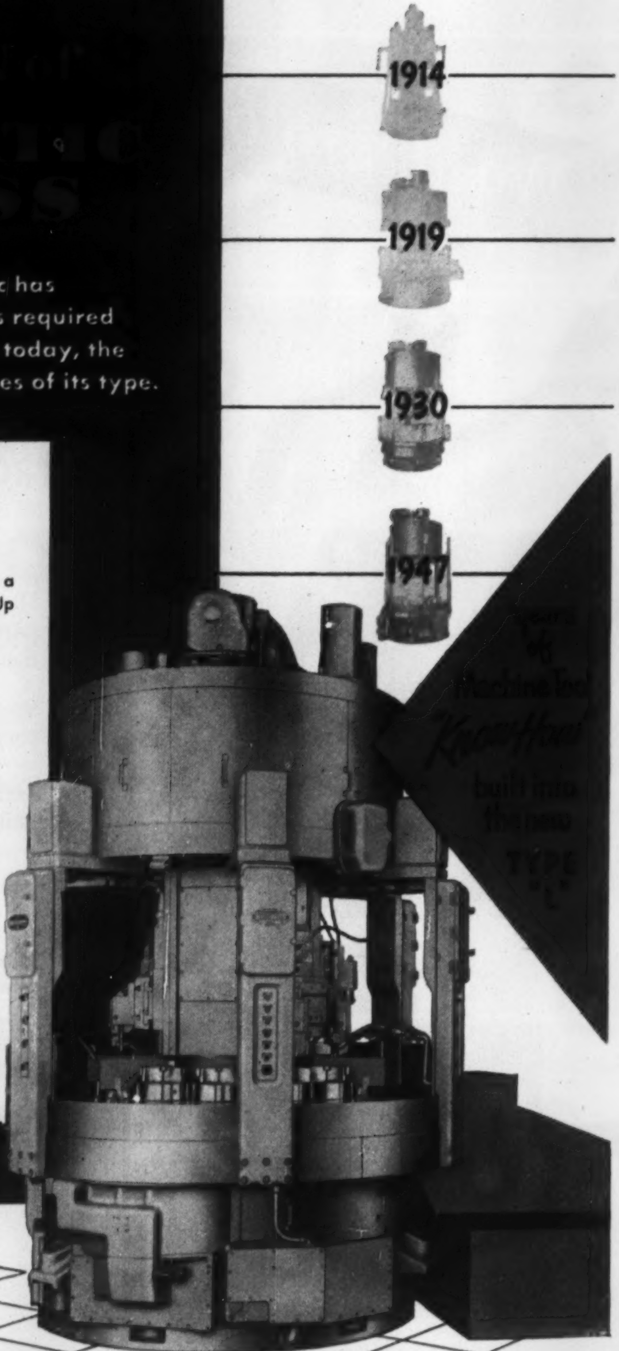
SELECTIVE SPINDLE SPEEDS

Range from 35 r.p.m. to 1,000 r.p.m. at each station providing the correct cutting speed to suit the specified operation.

CARRIER INDEX

The new indexing mechanism with improved carrier column bearing permits faster index of spindle carrier thereby reducing time between cuts. New design index mechanism registers and locks carrier, on successive indexes, to within ±.0005.

SEVENTY FIFTH
BULLARD
ANNIVERSARY


1914
1919
1930
1947
years of Machine Tool "Know-How" built into the new TYPE "L"

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BULLARD SALES OFFICE,
DISTRIBUTOR OR . . .

MULT-AU-MATIC TYPE "L"

Available in three sizes
10" with 6, 8, 12 or 16 spindles, 14" and 18" with 6 or 8 spindles.

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

FIELD REPORT: NO. 91

WHICH DIE STEEL WOULD YOU USE HERE to increase production from 100 to 23,000 parts?

Even after trying many different die steels, production averaged only about 100 pieces before this ring die had to be replaced.

The die cold forms cups as the first operation in producing rocket projectile noses from SAE 1010 Steel. Even though the ring die is press fitted into a four foot diameter hardened retainer ring (Rc. 34/36), the 1700 tons of pressure exerted in power extrusion prematurely stretches the die. The 12 lb. 2 oz. cups must be held within .2 of a lb. and wall thickness within .010″.

Which die steel would you specify in a move to cut replacement costs and improve production?

From our customer Field Report files, here's how the toolroom solved the problem. The Carpenter Matched Set Method showed that Carpenter VEGA (Air-Tough) Die Steel was a natural for the job. Latest report shows that the VEGA ring die had increased production from 100 to 23,000 cups, and is still banging them out.

What better guarantee of success can you find for your own jobs than the word of hundreds of toolroom men who rely on Carpenter. Why settle for "ordinary" results when Carpenter is ready to help you explore the possibility for improvement? Call your nearest Carpenter Mill-Branch Warehouse, Office or Distributor now. *The Carpenter Steel Co., 139 W. Bern St., Reading, Pa.*

How can your toolroom use Carpenter Matched Tool and Die Steels to:

- Reduce hardening hazards
- Minimize machine downtime
- Boost output per grind
- Improve product quality

Carpenter STEEL

Matched Tool and Die Steels

IMMEDIATE DELIVERY from local warehouse stocks — Export Address: Port Washington, N. Y. — "CARSTEELCO"

GOOSE LAKE
FIRE CLAY

. . . Ready for delivery in 250 million years!

The above scene is what geologists tell us Goose Lake may have looked like 250 million years ago. Today—the scene is quite different. For now, this wealth of flora and fauna is far below the earth's surface . . . an excellent source of high quality fire clay.

Proved vital since man first started melting metal, fire clay is—to this very day—ever-growing in importance to all industry. And while good fire clay is abundant, this 250 million year old deposit at Goose Lake takes on added significance: *its proximity to the "heart" of mid-western industry.*

Processed under the most modern methods and facilities in a wide range of types and forms, fire clay by Illinois Clay Products Company offers you the economy and unique convenience of fast, dependable delivery.

ILLINOIS CLAY PRODUCTS CO.

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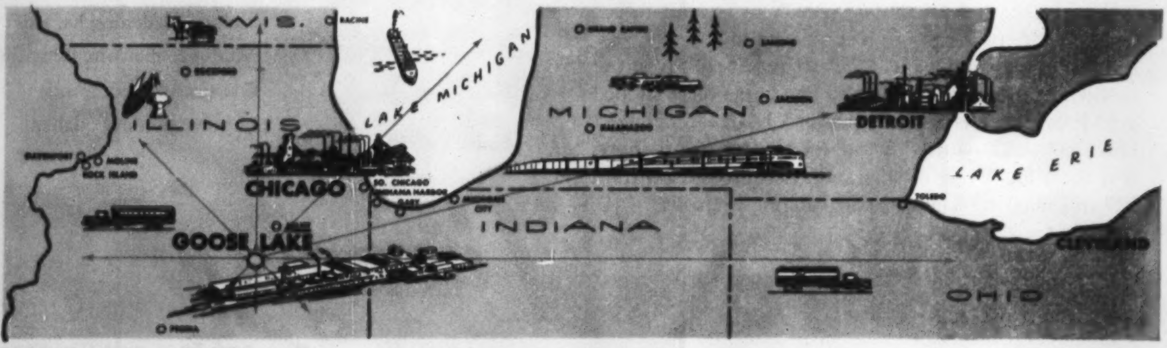
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DESIGNING WITH ALUMINUM

NO. 16

This is one of a series of information sheets which discuss the properties of aluminum and its alloys with relation to design. Extra or missing copies of the series will be supplied on request. Address: Advertising Department, Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, California.

A WELDING PROCESS IS AVAILABLE FOR EVERY PRODUCT USING ALUMINUM

Good weldability of aluminum alloys reduces the cost and improves the quality of the fabricated product.

The reliability of aluminum welds has been demonstrated by years of service in many applications. Still further developments in welding to improve the weldability of aluminum alloys have been as phenomenal in recent years as the growth of the aluminum industry itself. It is now possible to weld both heat treatable and non-heat treatable aluminum alloys. In addition, several new weldable, high strength alloys have been developed. Of equal importance are the new welding processes currently being adopted to extend the range of weldable alloys and to reduce the cost of welding. As a result of these developments, aluminum can be readily and economically welded.

Welding Processes

Spot welding of aluminum has been used for many years and continual improvements have made the process an important factor in aluminum sheet product fabrication. Pressure welding, one of the oldest methods known for joining metals, is a newcomer in aluminum fabrication. However, it holds intriguing possibilities for new applications (Fig. 1).

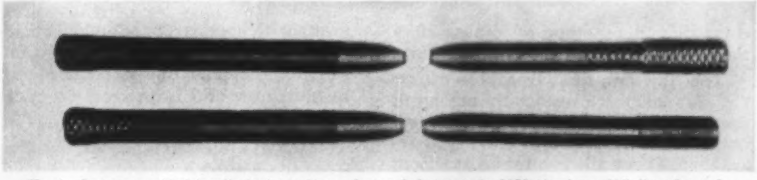

Fig. 1—Pressure welded tensile test specimen of annealed copper to 1100 aluminum ⅜″ diameter rod. Fracture occurred in the aluminum with 100% joint efficiency.

Gas welding and brazing, metal arc and carbon arc welding are all suitable for joining aluminum alloys, if the proper fluxes and filler metals are used. However, two newer welding processes are admirably suited for welding aluminum.

Inert gas tungsten arc welding (TIG). This process is an important aluminum joining method. In TIG welding an arc is drawn between the work and a non-consumable tungsten electrode in an atmosphere of argon or helium. No fluxing is required but filler material may be necessary depending on joint design. Table I shows typical welding conditions for tungsten arc welding of aluminum. TIG welding is a relatively cheap method which consistently produces high quality welds with good mechanical properties. With this welding process, flux contamination is eliminated as a source of corrosion. Welding can be performed in flat, vertical, and overhead positions by the TIG process, and distortion is minimized by the high heat input and welding speeds employed. For economy of operation, this process is recommended for sheet material thinner than ¼″, although it can be used for welding fairly thick aluminum alloy plate.

TABLE I

TUNGSTEN INERT GAS ARC WELDING (TIG) CONDITIONS

Sheet Thickness	Current Amps' a-c	Wire Consumed Lbs/100 ft of Weld	Welding Speed in/min/pass	Argon Gas Flow (cfh)	No. of Passes	Diam Tungsten	Filler Rod Diam	Gas Cup Diam (in.)
1/16″	80-170*	1/2	12	16-20	1	1/16-1/8″	3/32″	3/8-1/2″
1/8″	150-250*	2	12	20-25	1	1/8-3/16″	1/8″	1/2″
3/16″	180-320*	4	12	20-30	1 or 2	1/8-3/16″	3/16″	1/2″
1/4″	250-350*	9	10	25-35	2	3/16-1/4″	3/16-1/4″	1/2-5/8″

*Using Cooled Backup Bar

Inert gas metal arc welding (MIG). MIG welding is the most important development in recent years to extend and improve the weldability of aluminum. Here an automatically fed filler wire is used to draw an arc to the base plate in a shield of inert gas. As in TIG welding, no flux is required. One of the important advantages is that relatively unskilled labor can be used to operate the equipment. With a minimum of training, operators can make sound welds, at high speeds. Because no flux is used, there is no problem of corrosion by flux residue. Distortion, cracking and similar welding problems are minimized by the high heat input and welding speeds. Table II shows typical MIG welding conditions. This process is used for welding alloy sheet thicker than ⅛″ (Fig. 2), and joints in material as thick as 4″ have been made successfully.

Factors Affecting Weldability of Aluminum Alloys

Weldability of aluminum alloys depends on the product, service conditions, the alloy itself and on the welding process to be used.

The aluminum surface oxide film is the most outstanding characteristic influencing the welding of aluminum alloys. Generally, this film is one of the most desirable features of this metal. However, in aluminum welding it is

PLEASE TURN TO NEXT PAGE →

TABLE II

TYPICAL INERT GAS METAL ARC WELDING (MIG) CONDITIONS

Sheet Thickness	Current Amps a-c	Wire Consumption Lbs/100′ of Weld	Welding Speed in./min/pass	Argon Flow (cfh)	No. of Passes	Electrode Diam	Arc Volts	Wire Speed in./min
3/16″	170	4	24	50	1	3/64″	22	230
1/4″	200-250	8	24	60	1 or 2	1/16″	24-28	160
3/8″	240-300	16	24	60	2	1/16″	25-29	260
1/2″	250-320	30	17	60	2	3/32″	25-30	130

DESIGNING WITH ALUMINUM No. 16 Continued

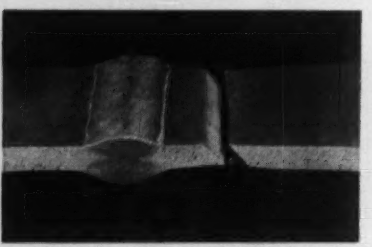

Fig. 2—Tensile specimen of MIG weld in 5086 alloy ¼" plate. Fracture occurred in parent metal at 40,000 psi with 15.7% elongation.

necessary to eliminate its effect. One method is to use a flux which dissolves and carries the oxide film away. In pressure and spot welding, the metal is cleaned so that the thin oxide film breaks up during welding. A third method of removing the oxide is by the action of the arc in the inert gas metal arc welding processes.

Thermal and electrical conductivity are also important in aluminum welding. Because aluminum alloys conduct heat and electricity much better than does steel, much higher currents must be used in resistance and arc welding them. Despite the low melting point of aluminum alloys, aluminum welding requires as much heat input as steel. Aluminum's high coefficient of thermal expansion accentuates internal stresses and warpage, which are also affected by the rate and amount of heat input. Consequently, high welding rates are more economical because expansion and distortion are minimized and less energy is lost.

Where structural strength requirements are high, porosity and crack sensitivity may be encountered. Welding processes and materials are now available for making welds that are consistently nonporous and crack-free. It is particularly important to use clean, dry sheet or plate, suitable filler metal, proper joint design and correct welding procedure.

Except in pressure welding, the welding operation results in fusion bonding two wrought or cast products with cast metal. It is important to recognize that weld metal is a casting and that filler metals must be selected which will combine with the parent metal to form strong, ductile weld deposits. Table III lists recommended filler metals.

TABLE III

RECOMMENDED FILLER ALLOYS FOR WELDING ALUMINUM ALLOYS

Base Plate	Filler Alloy Recommended
1100 3003 3004	1100
6061 6063 6066	4043, X5356, 5154
5052 5254 5086 5083	X5356
2024	2024, X5356

Weldable Alloys

Practically all aluminum alloys can be welded by one of the above processes. Some alloys are more suitable for welding than others. Good welds can be made in the low strength non-heat treatable alloys (1100, 3003, 5005, 5052, 5050) with little or no difficulty. Alloys 6061 and 6063 are also widely used for making strong welded structures by any of the standard processes. Where post-weld heat treatment is possible, joint efficiencies approaching 100% can be obtained. Alloys such as 2024 and 7075 are used in spot welded products. Although arc welded applications of these alloys are rare, recent use of 2024 alloy in arc welded structures, with or without a post-weld heat treatment, indicates that this method of joining 2024 may be more widely used in the future.

The new non-heat treatable alloys (5083, 5086) are especially strong in the as-welded condition, and have excellent formability and corrosion resistance. These alloys offer an excellent combination of properties in highly stressed welded structures for which they are already being used.

Properties of Welded Joints

Heat applied in the welding operation melts the base plate and filler material in all the welding processes used for joining aluminum, except pressure welding. This heat also anneals the parent metal near the weld. A good general rule for calculating the strength of welded joints is to use the properties of the annealed base plate as design criteria. Some joints are stronger than the annealed parent metal, so that with sound welds and with the beads intact, tensile fractures occur at the fusion line or in the annealed zone adjacent to the weld bead. Table IV shows typical properties of welded joints and illustrates the advantage of using 5083 and 5086 where high strength in the as-welded condition is desired. This further shows the improvement which can be obtained in 6061 welded structures which are heat treated after welding to produce high yield strengths.

The use of sound, economical welded joints with good strength and corrosion characteristics is one of the many reasons for the growing use of aluminum in both new and improved products.

TABLE IV

COMPARISON OF TYPICAL MECHANICAL PROPERTIES OF TIG OR MIG WELDS IN ALUMINUM ALLOYS 5083, 5086, 6061, 5052 AND 2024

(Transverse Specimens, Weld Beads Not Machined Off)

Alloy and Temper	Filler Wire	Condition*	Tensile Strength psi	Yield Strength† psi	Elongation % in 2"
5083-H113	X5356	A.W.	42,500	22,000	12.0
5086-H112	X5356	A.W.	39,800	21,000	12.5
5052, 1/4H	4043, 5052, X5356	A.W.	28,000	14,000	15.0
6061-T6	4043	A.W.	30,000	21,000	8.5
6061-T6	X5356	A.W.	32,500	21,000	9.0
2024-T3	2024	A.W.	40,000	20,000	4.0
6061-T6	4043	H.T.	44,000	40,000	5.0
2024-T3	2024	H.T.	54,000	45,000	4.0

*A.W., as welded. H.T., solution heat treated and aged after welding. †At 0.2% offset.

Further information concerning the welding of aluminum may be obtained from the Kaiser Aluminum sales office listed in your telephone directory or one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office:* Palmolive Building, 919 North Michigan Ave., Chicago 11, Illinois; *Executive Office:* Kaiser Bldg., 1924 Broadway, Oakland 12, California.

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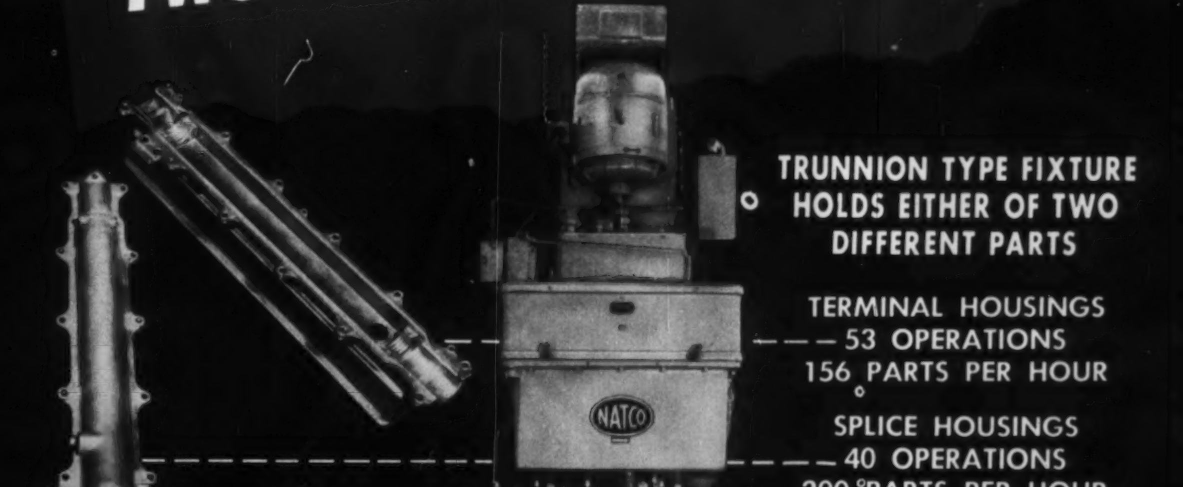

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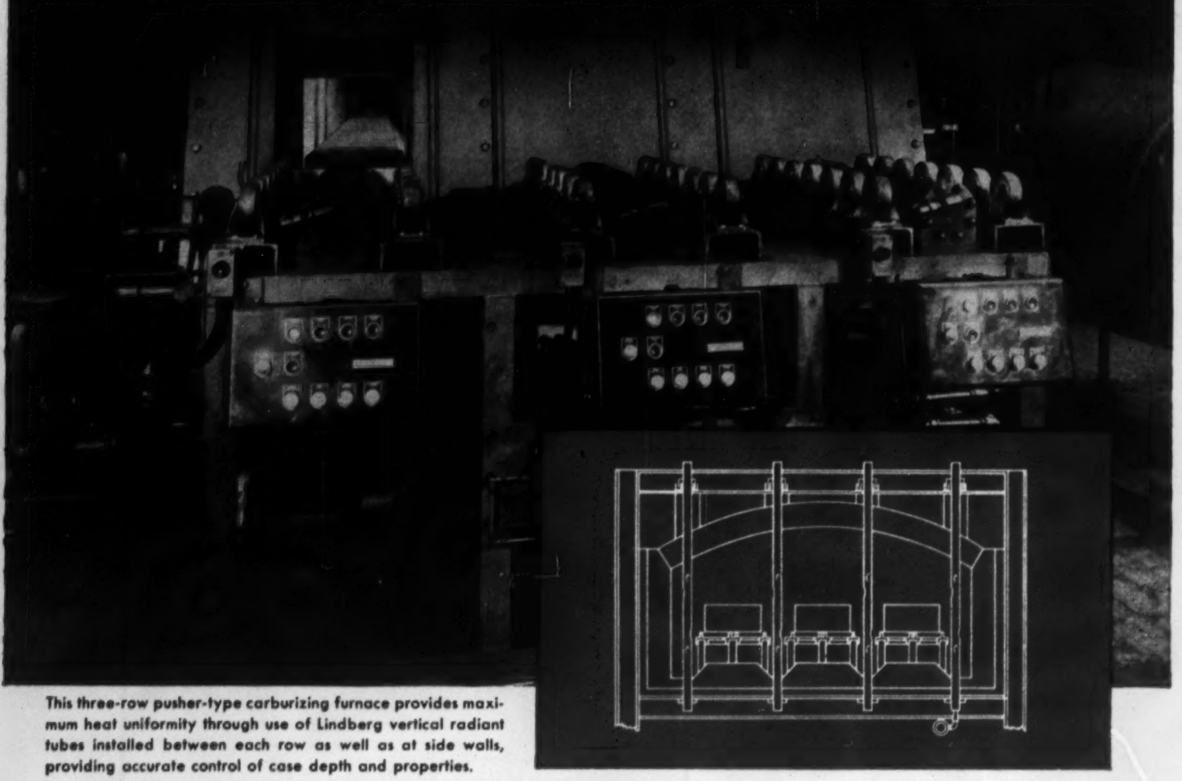

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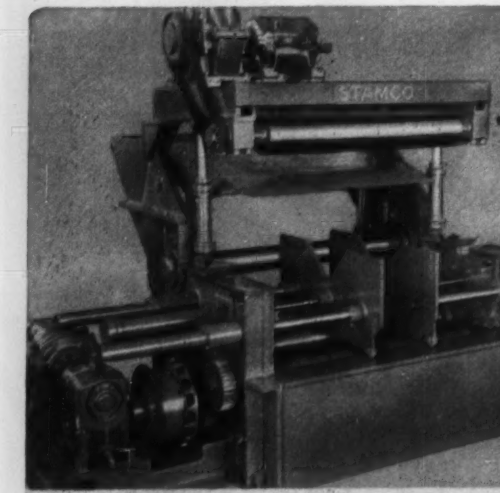

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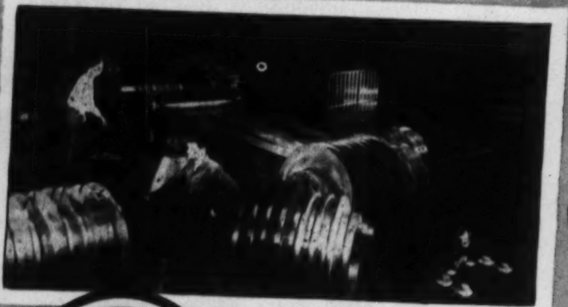

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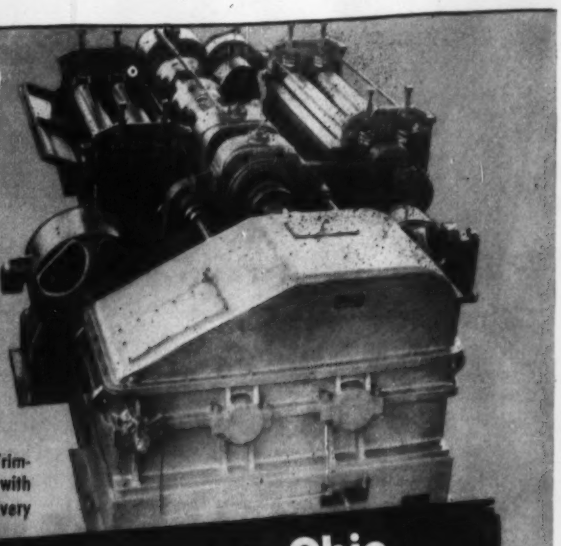

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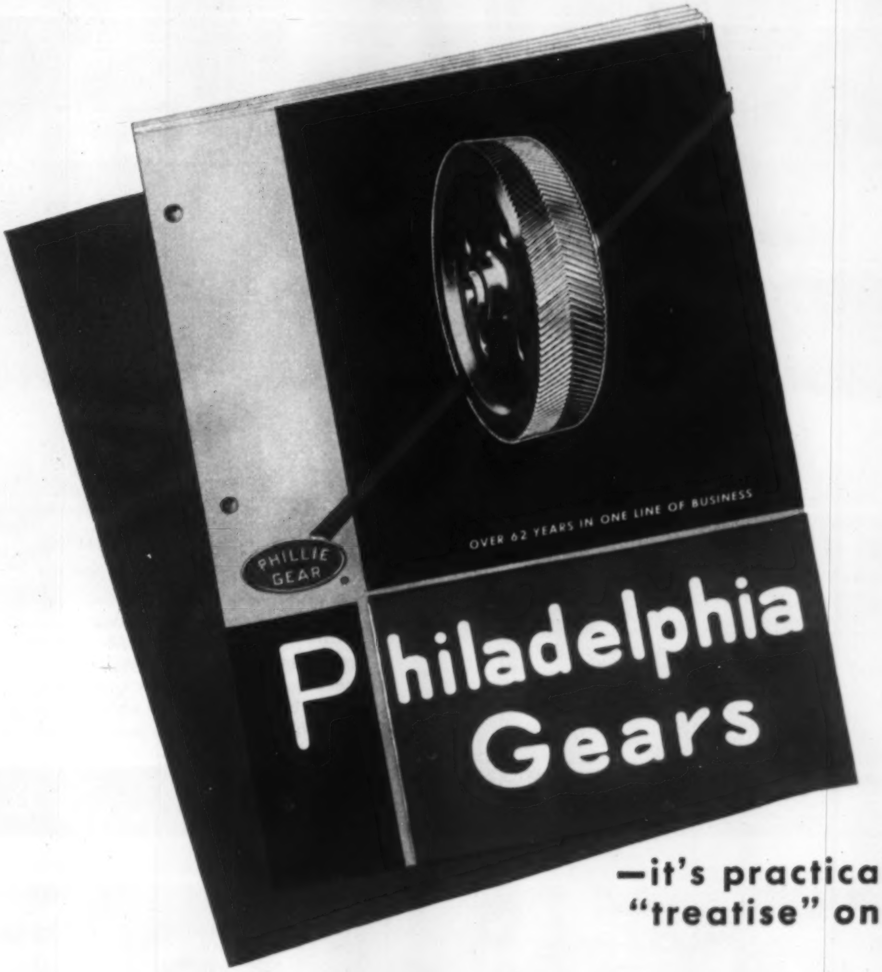

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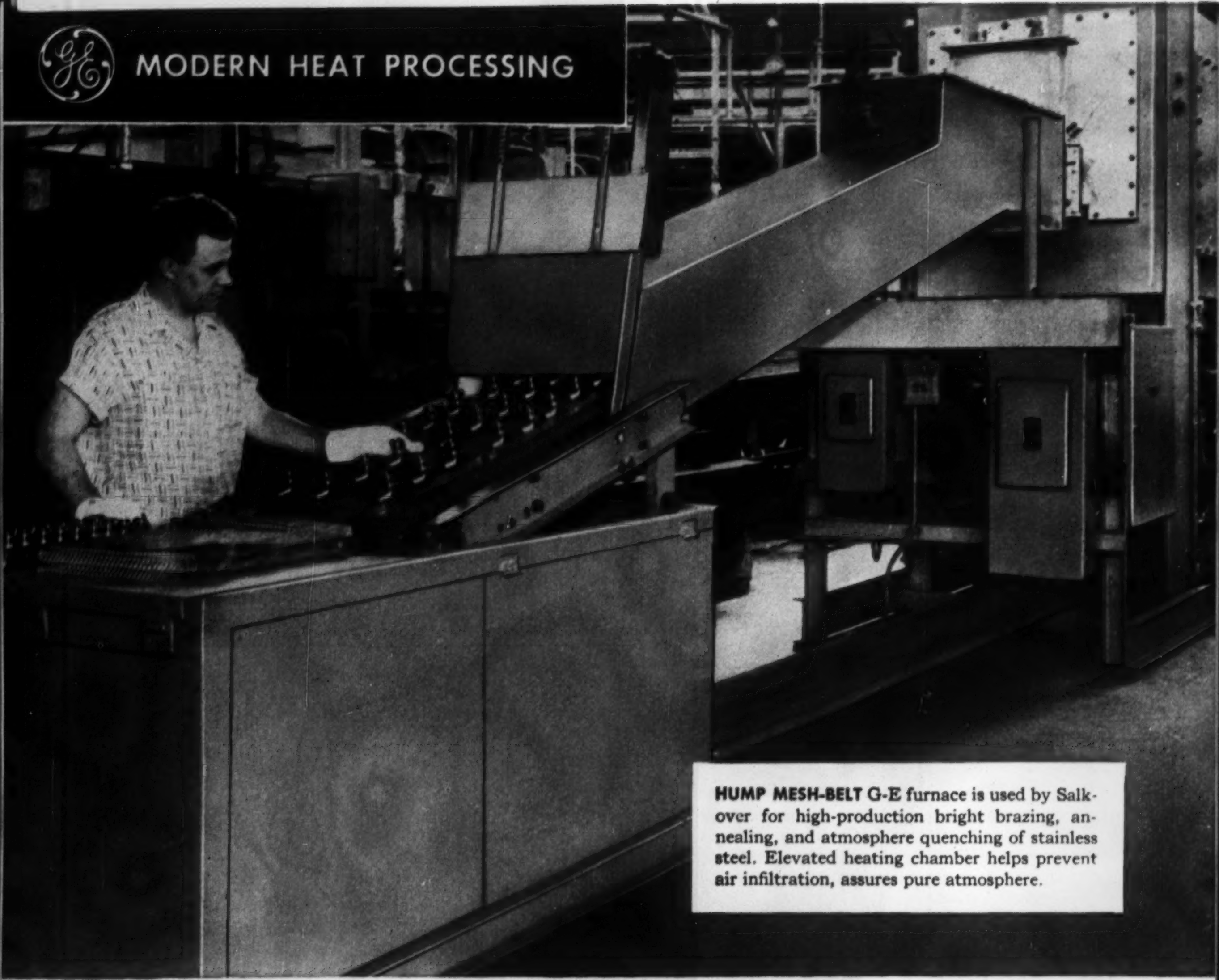

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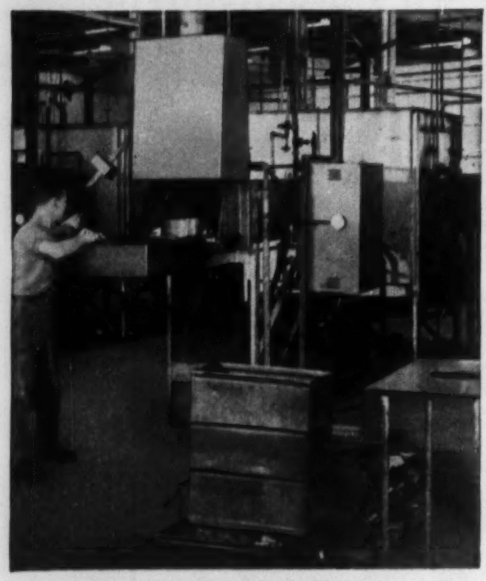

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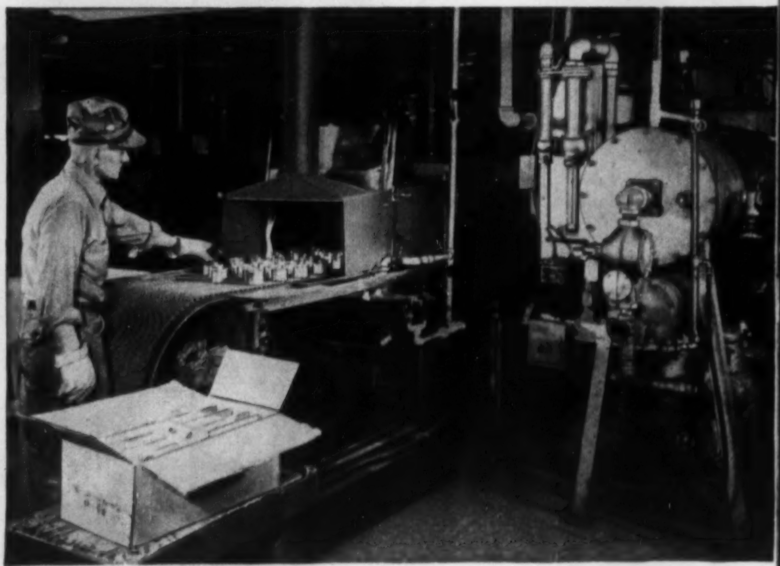

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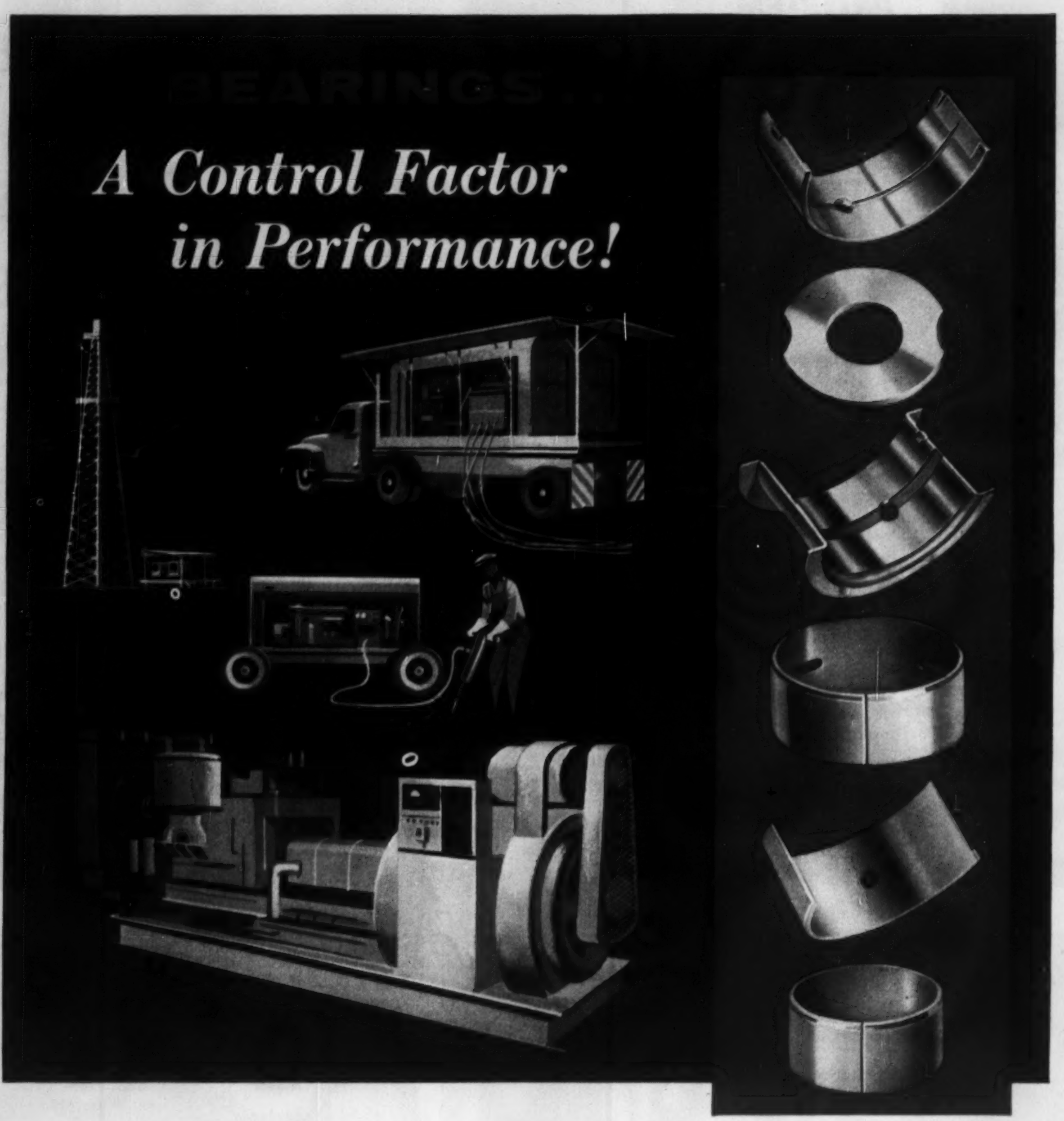
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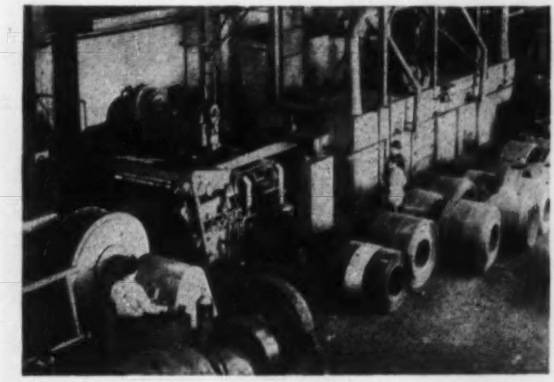

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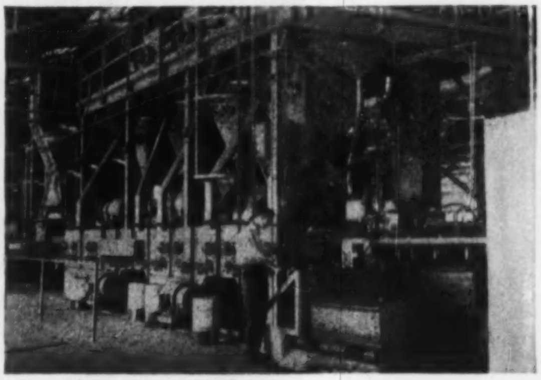

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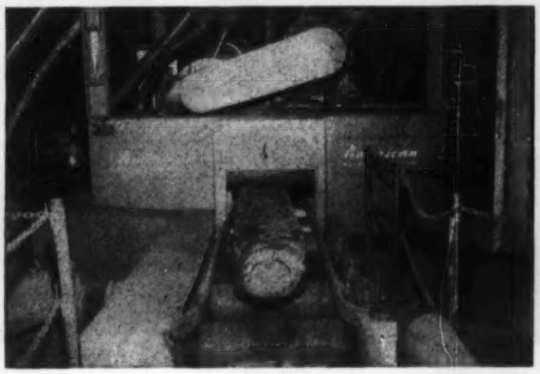

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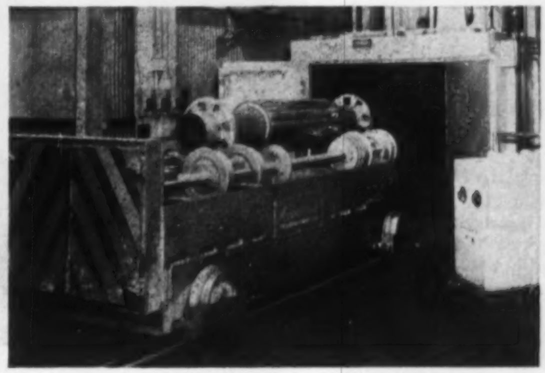

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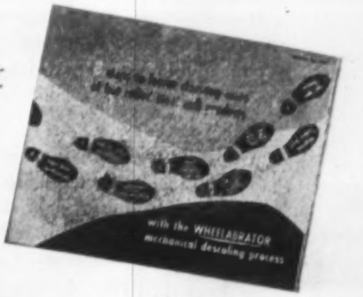

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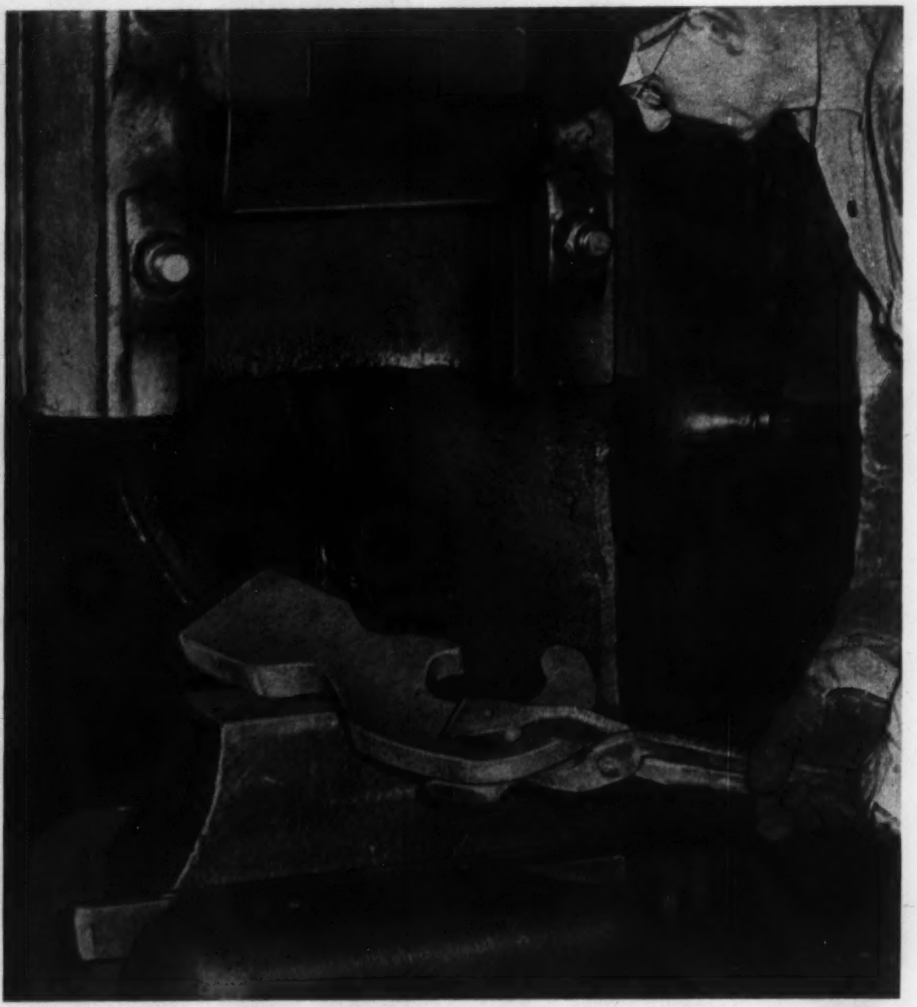

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Youngstown Welding and Engineering, Youngstown, Ohio, for example, stocks forged Monel hooks and other standard accessories. They are equipped, too, to make up special fixtures in Monel alloy . . . devices such as those shown in a useful new 32-page picture booklet, "Equipping the Pickle House for Greater Production at Lower Cost." For a copy of this booklet, write:

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50 YEARS OF *Nickel Alloy Progress*
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1905-1955

STEEL

November 14, 1955

Metalworking Outlook

Phony Ratings

"Government-priority steel probably accounts for less than 0.5 per cent of all our production, but it causes a far greater amount of our trouble," laments a steel producer (see page 63). One problem: A few unscrupulous buyers have attached phony DX ratings to their orders. Result: Many steel firms are forced to check all priority orders, with the inevitable delays. Next quarter the set-aside tonnages will be up substantially, particularly for plates and structurals, because St. Lawrence Seaway needs will be added to defense and atomic requirements for priority treatment.

Sixth Aluminum Firm

Olin Mathieson Chemical Corp. will be the nation's sixth primary aluminum producer. It will build an $80-million plant with an annual capacity of 60,000 tons on the Ohio river and is studying sites in Ohio, West Virginia and Kentucky. One being considered is near Cresap, W. Va. Construction will start next spring, and completion is scheduled for 1958. Pittsburgh Consolidation Coal Co. is joining in the project. It would supply coal for power to be generated in a proposed plant of American Gas & Electric Co. Pittsburgh Consol. would have a similar role in a still-pending deal with St. Joseph Lead Co. Besides the Big Three in aluminum—Alcoa, Reynolds and Kaiser—Anaconda Co. started production last summer. Harvey Machine Co. expects to be producing by late 1957.

Tool, Die Prospects Bright

Tool and die men see a record year in 1956. Reason: The orders being placed by automakers for completely new 1957 models. Shops as far from the Motor City as Philadelphia have already felt the impact which will hit its peak early next year.

Development at Ford

Ford Motor Co.'s new plant at Lima, O., reportedly will set new standards in automatic engine assembly. Engineers say automatic feeding of many components, as well as nuts coupled with nut runners and an indexing assembly line similar to that at Plymouth, will make possible a big step toward automatic assembly. That's the next big frontier of automation. Ford, incidentally, expects to spend more than $1 billion over the next three years on plant and equipment. To provide capital and flexibility for such spending is one reason why Ford will offer some of its stock for public sale.

Union Merger in December

Look for the new American Federation of Labor and Congress of Industrial Organizations to be formally launched when the AFL and CIO meet in joint convention Dec. 5 in New York. One of the few remaining wrinkles that might have delayed the merger has been ironed out. John W. Livingston, a UAW-CIO vice president, will get the important post of director of organization in the new group. Another wrinkle, the question of who will head the AFL-CIO political and education program, was smoothed with a compromise. Jack Kroll, now heading the CIO Political Action Committee, and James L. McDevitt, holding a similar AFL job, will be co-directors. Total AFL-CIO membership: About 15 million. Some 2500 unaffiliated unions in the nation have 6 to 7 million members.

Buyers Predict

Chicago purchasing agents report: Deliveries are slower; inventories are stabilizing; employment and production remain high; order backlogs stay about the same. Some 98 per cent of the buyers expect first quarter business to be as good as or better than this period's activity.

Conclusions on Automation

Here are conclusions that can be drawn from the Congressional hearings recently held on automation: 1. Automation requires no new legislation or legislative changes. 2. It will make factory jobs safer and less monotonous. 3. It will spread through the economy gradually without explosive effects. 4. It will not bring widespread unemployment because industry generally recognizes its responsibility to retrain the displaced.

Presidential Troubles

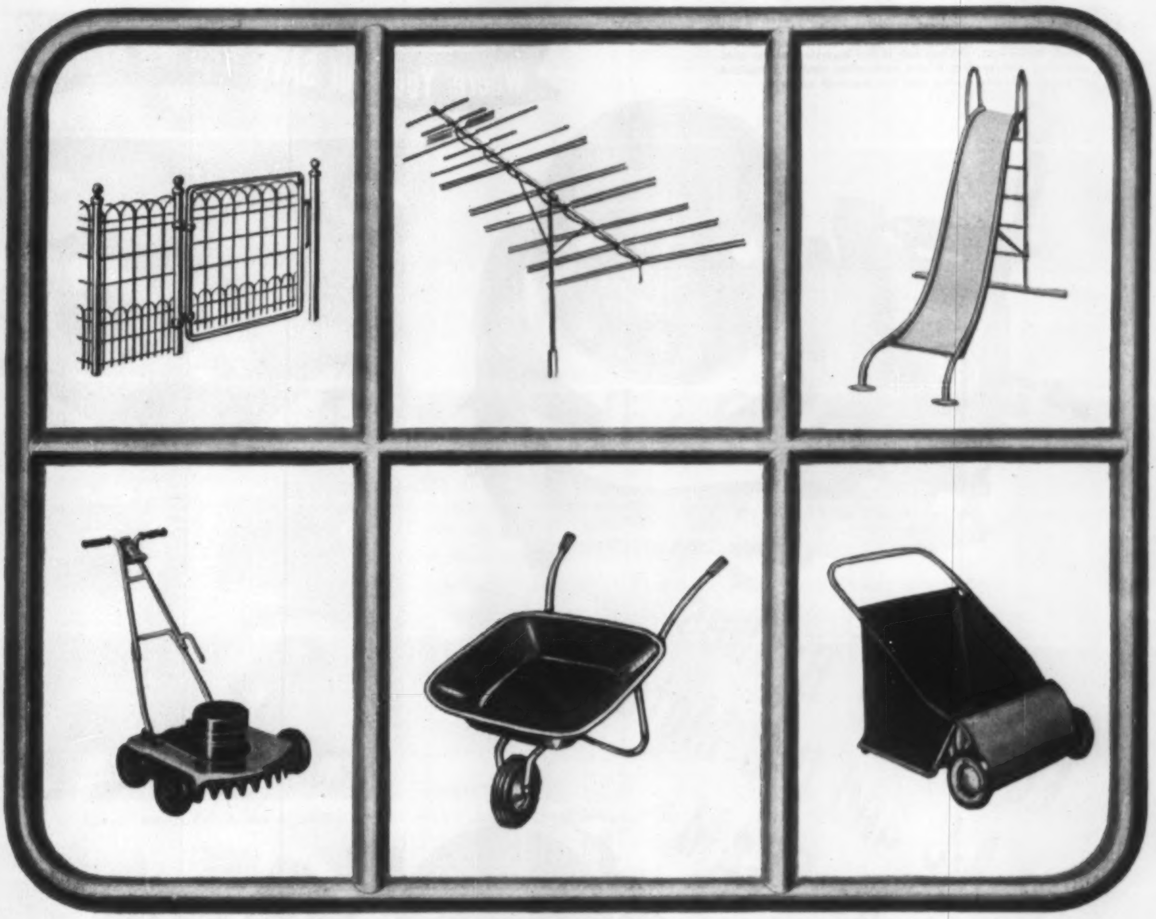
What bothers company presidents most? Lyle M. Spencer, president of Science Research Associates, Chicago, says: Too much to do in too little time; not being a doer; the frustrations involved in finding executive talent; setting a company direction; finding expert advice; securing working capital; making crisis decisions; excessive negotiations with labor, customers, banks.

Crimes Against Property

Crimes are increasing against property, warns Ernest W. Fields of Federal Insurance Co. Before 1940, the largest proportion of infidelity losses involved loss of cash, including check forgery. But now 75 per cent of the dollar value of infidelity losses results from embezzlement or stealing of materials or merchandise. Crimes against property increased 26.7 per cent from 1950 to 1954. Raw materials, finished products and scrap from manufacturing processes are the current prey of the dishonest.

Straws in the Wind

Canada's uranium production will be a $180 million business by 1958, provided export markets develop . . . Early witnesses before Sen. Joseph O'Mahoney (Dem., Wyo.) and his committee studying General Motors Corp. urged curbs on GM-size firms; Theodore K. Quinn, a former General Electric Co. vice president, proposed setting a limit of perhaps $100 million on the net worth of a corporation . . . In the first nine months of 1955, the steel industry's payroll hit a $2.6-billion high. The previous record of $2.5 billion was set in the same 1953 period.



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May Improve Your Products, Too

A new kind of material is now going into the products you see here.

It is Armco ZINCGRIP Tubing. Besides being modern looking, it gives these products the unbroken rust protection of a hot-dip zinc coating, along with the strength of welded tubing.

This welded tubing is made of Armco ZINCGRIP, a special steel coated on both sides with zinc by a patented process. Even the welding flash is planed away on the outside, and a new zinc coating applied to form an almost invisible seam.

What's more, the special coating stays on when Armco ZINCGRIP Tubing is bent or twisted into shape by the manufacturer. There are no zinc-bare spots where rust can get a quick start.

Armco ZINCGRIP Tubing is made in outside diameters of ⅜-inch through 3 inches, with wall thicknesses of 20 gage through 12 gage. For information and prices, just fill out the coupon and mail it to us.

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Quote me on:
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FIRM: ________________
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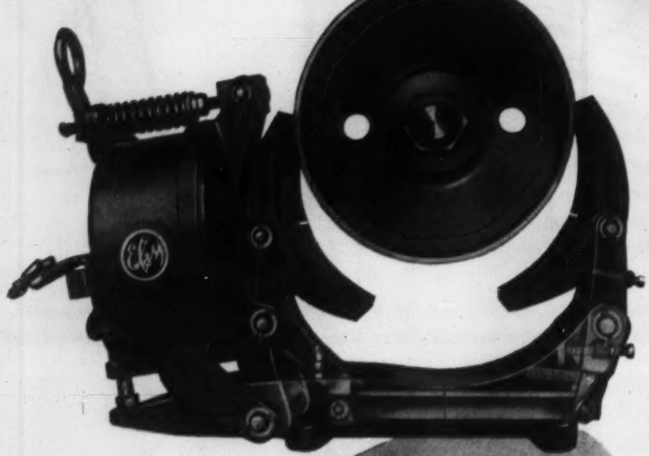
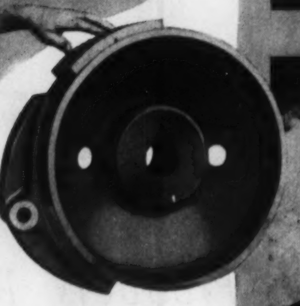
SPECIAL STEELS

SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

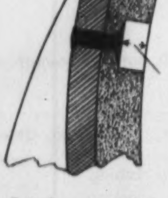
Type WB Brake showing how the motor armature is easily lifted out. At top left is the handle-nut for compressing the spring when removing motor armature, changing brake shoes and for manual control.



Long Life Brakes for A-C and D-C Motors by EC&M



The brake lining is molded to match curvature of wheel and shoe.



Actual wearing thickness, between rivet heads and brake wheel, is 1/8″ on the smallest size to 7/16″ on the largest size.

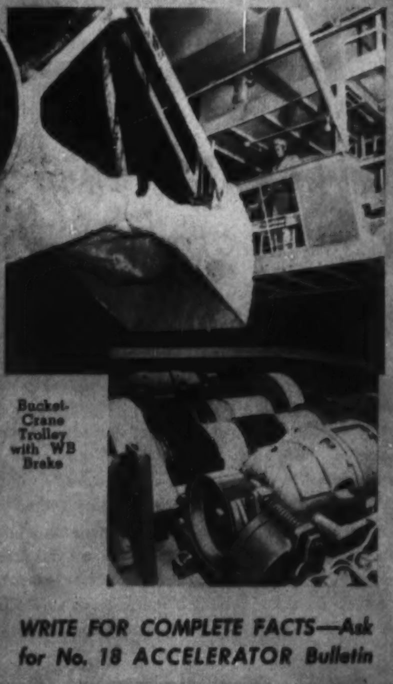
These Type WB Brakes use a block type lining which is both thick and tough.

Furthermore, due to the process of manufacture, the blocks have proper frictional quality *throughout the entire thickness* permitting uniform and complete wear down to rivet heads. And since the material is non-compressionable, brake adjustments are infrequent.

Where You Will SAVE With WB Brakes

A-C Mine-Hoist Motor with WB Brake

Reduces Delays on Foundry Crane



Bucket-Crane Trolley with WB Brake

WRITE FOR COMPLETE FACTS—Ask for No. 18 ACCELERATOR Bulletin

THE ELECTRIC CONTROLLER & MFG. CO.

4498 LEE ROAD • CLEVELAND 28, OHIO

November 14, 1955

Why Cut Prices?

Last July the editors of this publication investigated and reported to you on price cutting in the metalworking industry.

In checking with a cross section of the people selling materials, component parts, equipment and finished products, the editors found: In the midst of the greatest prosperity in U. S. history, prices were being slashed without regard to costs.

The immediate reaction from hundreds of metalworking executives was that the situation was not confined to a portion of industry. It was appallingly widespread.

Many price wars, reminiscent of the fire sale in electric generating equipment early this year, were raging. In the industrial equipment field, one company decided to grab a bigger share of the market by plunging into wholesale price cutting. Immediate retaliation followed. On a government job, another company decided not to be outsmarted and bid 40 per cent under its nearest competitor and, of course, well below cost. The job could have been sold at a fair price. Nobody won but the government.

The intolerable price situation *still* prevails in many industries. It results from a combination of factors:

—The unscrupulous buyer who tells the visiting salesman that a competitor is quoting a lower price.

—The weak-kneed salesman who believes the story.

—The home-office management that permits its salesmen to be inveigled into price cutting as a last resort in closing a sale.

The situation is far from hopeless. Looking beyond the emotional aspects of the problem, it is evident that two business fundamentals are involved:

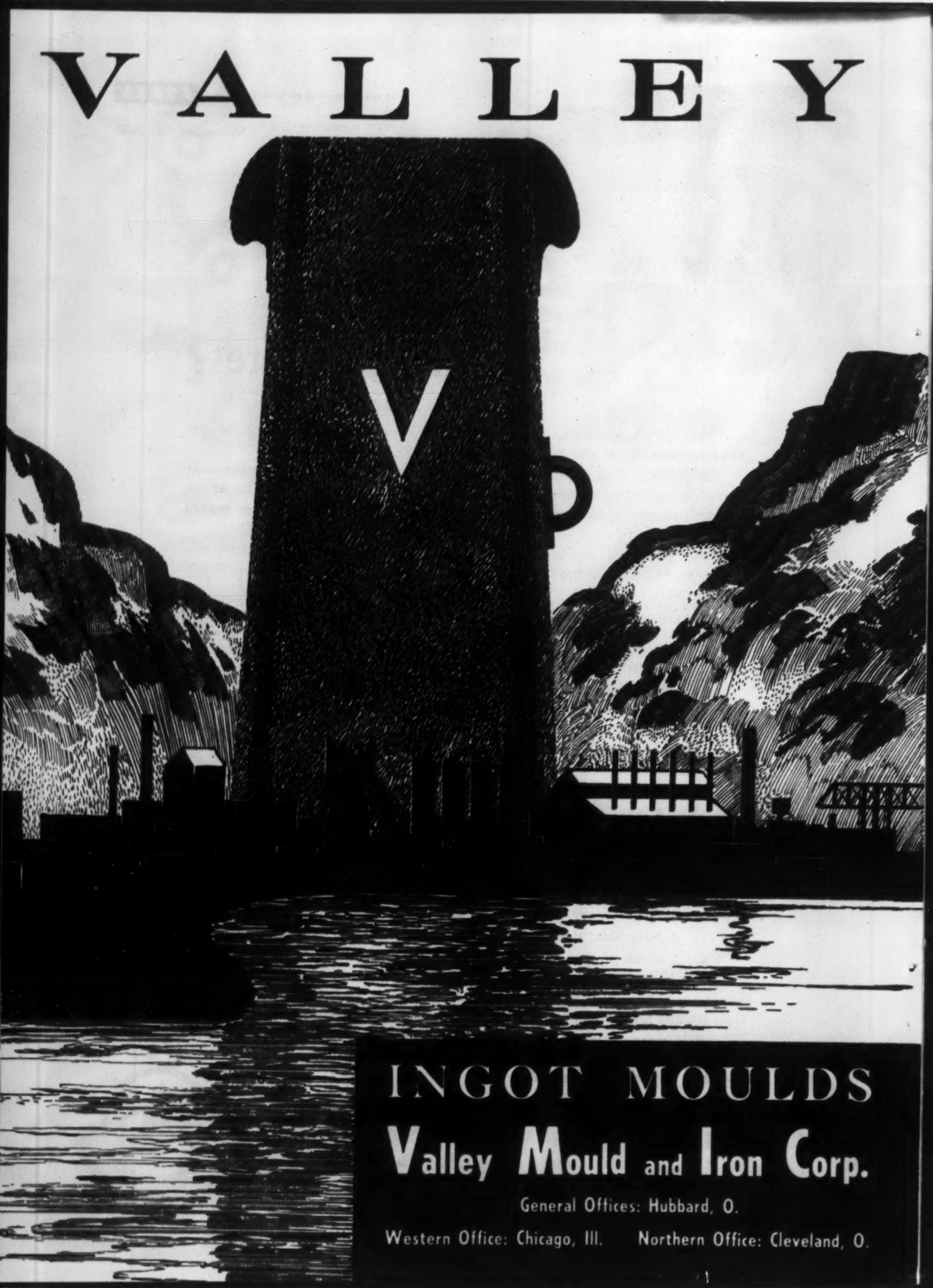
1. A *busy* plant does not mean that the company is making money.
2. Methods of determining costs and selling prices can become obsolete.

Many people realize their dilemma and are seeking a way out. They're analyzing costs, studying markets and distribution methods. They're selling quality and service and ignoring marginal or sporadic competition.

Fair competition in industry is commendable. It's good business. Price cutting isn't fair competition or good business. Invariably, it results in a waste of men, materials and methods.

Irwin H. Such

EDITOR



VALLEY

INGOT MOULDS

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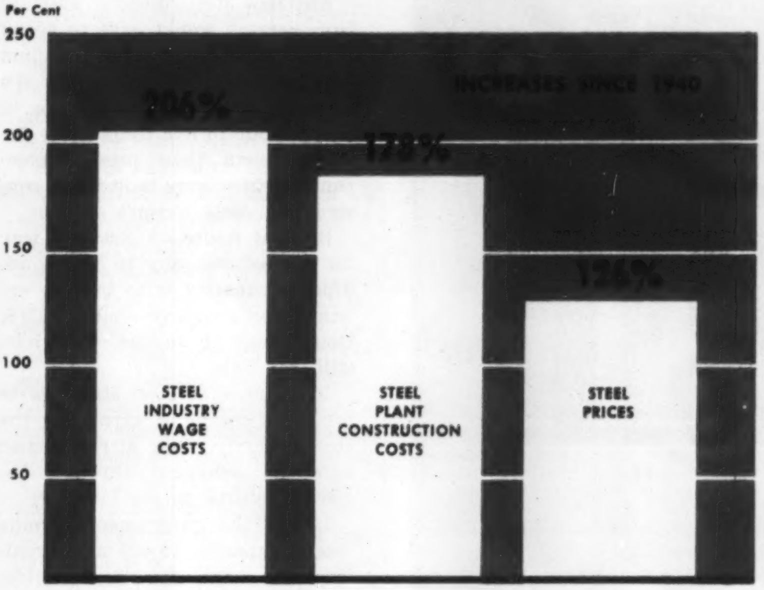
Why Steel Prices Will Rise



Sources: Wage costs (American Iron & Steel Institute)
Construction costs (Engineering News-Record)
Prices (STEEL)

Economic pressures are building up to a point where . . .

Steel Prices Must Rise

STEEL PRICES may go up $12 a ton by next July.

Increases won't come in one swoop. They may start this year and bob up all through the first half of 1956, climaxing when steel wage settlements have to be paid for beginning next July.

Economic pressures are building up to a point where steel producers will have no choice but to raise prices.

Producers face: 1. Rising costs of materials used in day-to-day operations. 2. Need for money to expand and replace capacity.

You Go First—The last several weeks have brought a crescendo of statements by steel executives that higher steel prices are needed—but, no one wants to be the first to make a general or substantial increase. Everyone is willing to be a follower.

An increase will not be announced much in advance of its effective date. That's customary. Prices charged are those in effect at time of shipment. If there were long notice, steel companies would be swamped by customers wanting pre-raise shipments.

Cause for Talk—Strong demand is emboldening steel producers to talk about higher prices. You're less inclined to talk about increases when business is slack.

An across-the-board increase at the end of next June as a result of wage negotiations is a foregone conclusion. If it's like the one at the end of last June, it will be an increase in base prices.

Selective—Any price increase before next mid-year likely will be on selected products—the least profitable ones. Upward adjustments might be in base prices or extras, whichever is the most in need of revision. The changes probably would come piecemeal.

Steel prices can be raised as much or more through revision of extras as through revision of base prices. In the first half of 1953, extras were upped $5 a ton, followed by a $4-a-ton increase in base prices.

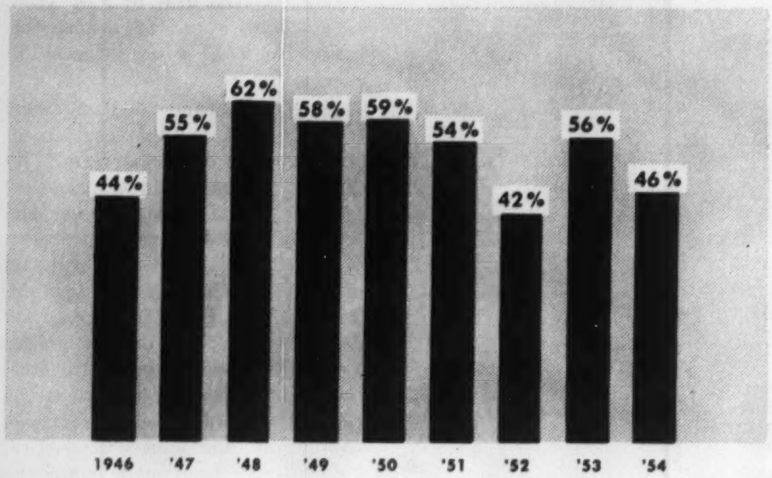
Least Vulnerable — U. S. Steel Corp. is probably the least likely company to be embarrassed by lack of followers in a price increase. If it's going to set the pace for any near-term price increase, it probably won't bring on any general increase. Roger M. Blough, U. S. Steel chairman, said on Oct. 26: "We do not anticipate any general increase in steel prices at this time." Prices, he pointed out, are being reviewed continually, and some scattered revisions have been made since the general increase last summer. There may be more such changes (but nothing more than that in the early future), he thought. That would suggest price increases will be on selected products—not across-the-board.

Chain Reaction—Base prices of steel now average $9.69 a net ton above those prevailing before the 1955 steel wage increase, but producers have to cover the higher prices of materials, too. Refractories cost more (for instance, high-heat duty fire clay brick is up $8 a thousand); steelmaking scrap is up $10 a gross ton; zinc is up 1 cent a pound; and some of the ferroalloys have risen.

The costs of expansion and plant replacement also confront the steel industry. It must expand almost 50 per cent in the next 15 years (see STEEL, Sept. 5, p. 41). It doesn't have the money to do it. Steel plant construction costs have jumped 178 per cent since 1940: It takes $2.78 to buy as much construction as $1 would in 1940.

Replacement of facilities should be paid for out of current sales revenue, steel company executives point out. If there is any sure way to ruin a business, it is to borrow new money to replace existing equipment, they emphasize. "It's all right for a steel company to raise capital for additional capacity, but we would be following

STEEL EARNINGS: Half are plowed back into expansion and modernization



Source: American Iron & Steel Institute

an unsound course if we raised capital to replace old, worn-out plants," Ernest T. Weir, chairman, National Steel Corp., declares.

Outdated—Inflation has outrun the government's policy on depreciation. The total number of dollars the government will let you recover in depreciation over the life of a facility is limited to the number of dollars originally spent for it. The depreciation dollars recovered today, based on the dollars spent many years ago for facilities, are not enough for replacement.

The government's antiquated policy on depreciation makes it appear steel companies are more profitable than they really are. If the producers could set aside for depreciation what it takes to buy new capacity, earnings before taxes would be much less than they are today. Federal taxes would be less. The government doesn't like that prospect. In 1954, the federal government took almost as many dollars from 33 steel producers as it left them for payment of dividends and reinvestment (see supplement to STEEL, Apr. 11, 1955). The federal government, without any investment in the steel industry, took $556.2 million from it, leaving investors $605.6 million. That sum had to be split two ways—to the stockholders and to reinvestment.

Four Sources—There are three other ways to obtain money for plant and equipment: 1. Issuance of stock. 2. Borrowing. 3. Reinvestment of earnings.

Steel company stocks have not been highly attractive to investors. The steel industry has been paying out in dividends less than half of its net earnings. In six of the nine years from 1946 to 1954, from 54 to 62 per cent of net earnings was reinvested in the business.

Many investors are trying to decide whether the long-term outlook for the steel industry is such that they are willing to have the bulk of the earnings retained for investment instead of going to them as dividends.

Underpriced—The languid interest in the steel stocks is reflected by market prices. Common stock of seven of the ten largest steel producers is selling for less than the book value per common share.

The book value today of a ton of existing steel ingot capacity averages $60. To build capacity today, a steel company will have to spend from $80 to $300 a ton.

Uninspiring—The lackluster of steel investments is emphasized by the absence of new, large companies. The last 15 years have brought into existence only one steel producer which has 1.5 million tons or more of ingot capacity today (Kaiser Steel Corp., in California).

Any new steel company starting from scratch would have to spend **at least $300 million for 1 million** tons of integrated capacity. To make a profit, it would have to charge four to five times more for its products than present companies, which were built when construction costs weren't so dear.

Blocked Route—A low-cost way for a steel company to obtain additional capacity is to buy an existing steel company—but the U. S. Department of Justice won't hold still for this.

If issuance of steel stocks is to become a means of expanding the steel capacity, their attractiveness must be enhanced through improved returns to the investor.

Unless the government permits steel companies to set aside realistic amounts for depreciation, there's only one other way out here: Higher steel prices, so there'll be enough money in the till to pay for high costs of new construction (reinvestment) and leave enough over for attractive dividends to investors.

The fourth way to get money for expansion is to borrow. But borrowed money must be paid back. How? From the sale of products—through prices. And prices charged today are based largely on construction and equipment costs that were a sixth to a third of today's.

Prices Are Key—As long as the government holds to a policy of unrealistic depreciation, there's only one way the steel industry can get enough money to pay the increased costs of expansion and replacement: Higher prices.

While there's economic pressure for higher prices, there's a political restraint. The steel industry doesn't want to stimulate inflation. Additional inflation might bring further government restrictions on credit and vituperation upon the industry. The steel industry has been a whipping boy more than it likes.

Worst Is To Come — Although pressures are building up for higher prices for expansion, the situation will become even more acute a few years from now—unless lower-cost facilities for producing steel can be adopted.

The pressure built up thus far is for funds to expand present plants. They can be expanded for much less than new plants can be built. Republic Steel Corp. expects its latest expansion (of present facilities) to be achieved for $80 an ingot ton of capacity. If you build a new plant, it will cost you as much as $300, or a little more, a ton—if you have to provide raw materials sources also.

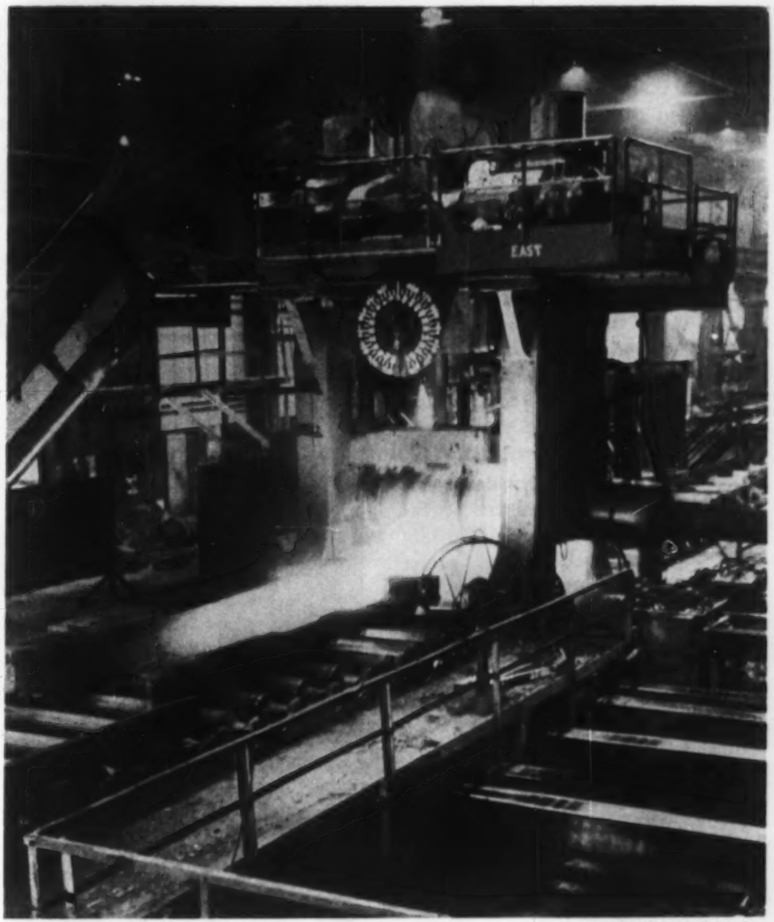
Near the Limit — The steel industry can enlarge its ingot capacity perhaps as much as 15 per cent by expanding or improving present facilities. Republic Steel's program will expand its capacity 15 per cent, but that is as far as it can go without building new plants. Jones & Laughlin Steel Corp. is expanding its ingot capacity 11 per cent. Only at Aliquippa, Pa., and Cleveland can it go beyond its present expansion plans. Inland Steel Co. will increase the ingot capacity of its plant 15 per cent.

When companies reach the limit in expanding present facilities, they'll probably pay $300 a ton or more for construction. A 15-per-cent expansion in the present steel ingot capacity should be accomplished in the next three years. By 1959, the steel industry will have to raise a lot more money for new steel facilities than it does today.

How To Do It?—How to raise that vast amount of money is being studied intently. The problem may prove to be formidable enough to force radical changes in methods of steelmaking. One move might be the widespread adoption of oxygen converters.

Whatever kind of capacity is installed, the steel industry wants to install it. It knows that if it doesn't, the government will—yet the industry is severely handicapped by the government's policy on depreciation. As long as this restriction exists, there's only one way to get the money needed for expansion: By increasing prices.

• *Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*



Youngstown Sheet & Tube Co.

Does heavy equipment holdup threaten steel expansion? . . .

Steel Builders Take Stock

LAST spring, steel companies could plan expansion with confidence that the necessary equipment would be delivered within six months. Today, it's taking twice as long.

The situation may get worse before it gets better. Deliveries of heavy steel mill equipment—blooming mills, rolling mills, galvanizing lines and the like—are extended anywhere from 8 to 20 months. And equipment builders say inquiries are coming in as fast as ever. One typical comment: "October broke all records for new orders."

Profile—Here's STEEL's composite picture of a builder. His order backlog was $30 million in March, now it's $60 million. Delivery of "off-the-shelf" items takes eight months. If much engineering is needed, it may require over a year. The builder has firm contracts running well into 1957.

His plant is working three full shifts. Engineers are his major manpower problem, even though he has doubled the number of men on his boards during the last six months. He's adding more by borrowing from local engineering outfits. Because most of his contracts call for tailoring equipment to match existing plant, almost all projects involve extensive engineering. Even getting equipment in through the door can mean headaches.

Shortages — Lengthening deliveries on many materials and subcontracted components add uncertainty to his scheduling. Paradoxically, many builders say their biggest materials problem is the growing shortage of structural steel and heavy plate. Heavy electrical equipment shortages are cited also (see page 62). One builder placed an order for mill drives in August for September delivery which has been pushed back to May next year. And the full effects of the Westinghouse Electric strike are still to make themselves felt.

Though not so widespread, shortages in other lines are beginning to be noticed. One northeastern builder, itself losing seven weeks of production from the floods, now finds that deliveries on castings and forgings are stretching because suppliers also were inundated. Castings over 300 lb, says another, are taking about ten weeks to deliver, double the normal time. Speed reducers, bearings, gears, weldments and hydraulic equipment are other troublesome components. One builder quotes 16-month delivery on weldment lines.

Parallel — Rollmakers too, are coming under increasing pressure from customers. Orders for rolls for the new equipment are piling up on top of regular replacement business, already heavy because of near-capacity steel operations through the summer.

Roll order backlogs are extended perhaps a month over normal. Says one maker: "Our ten-week backlog puts us at our busiest for the postwar period."

No Sweat?—Today, neither the equipment builders nor the steel mills appear too worried about the situation. But if expansion plans keep coming in, and the order backlog is pushed much above a one-year average, it would be a different story. Builders are putting out their best efforts to meet anticipated demand by expanding their own facilities. They have ample justification. The current flood of orders is only the opening bell for a 60-million-ton steel expansion over the next 15 years.

DANGER
HIGH
VOLTAGE

Westinghouse Electric Corp.

Increased demand, not lack of capacity, is why . . .

Electrical Shipments Lag

IS THERE ENOUGH heavy electrical equipment capacity to meet expansion requirements?

Some steelmakers are asking that as they survey profitable results of the first three quarters and plan for expansion. Optimistic as their plans are, there's a flaw in the picture.

C. M. White, president of Republic Steel Corp., Cleveland, warns: "Scarcity and extended delivery time of heavy electrical drive equipment may be a major factor in delaying mill building."

No Shortage—"Extended delivery times would not indicate a lack of facilities," explains Joseph F. Miller, managing director, National Electrical Manufacturers Association, New York. "It's my belief that there is no shortage of capacity for production of heavy electrical equipment."

Problem Is Deeper—Purchasing agents and production planners find the immediate problem is getting full output from available facilities. Strikes and material shortages are the bottlenecks.

"Heavy electrical equipment deliveries are gradually slowing, but they are not holding back projects," adds a Pittsburgh area purchasing agent. "Our plans for installation are made on such long-term schedules that we haven't encountered any shortages. A continuance of work stoppages into late fourth quarter would definitely have an effect."

Effect of Walkout—Despite its strike, Westinghouse spokesmen say: "We remain current on heavy apparatus deliveries."

Other equipment makers point out that heavy electrical equipment is specially designed and engineered, with delivery from six months to a year from order dates.

More Trouble — Added to problems of work stoppages are slower deliveries of steel to equipment makers and longer order backlogs at those firms. Engineering may require more time than before as electrical controls grow more complicated. Steel plate deliveries to builders of equipment have been received one or two months late during the last half of this year, and copper shortages further hamper equipment makers.

Most observers admit these problems are symptoms of heavy and growing demand, rather than shortage of capacity. "Probably electrical equipment will be in short supply as long as we have expansion of capital goods industries," says the vice president-production of a Pittsburgh steel firm.

Defense Ratings Examined

Buyers say they are having difficulty placing defense-rated orders for steel. Looking into that situation last week was a steel industry task force.

A member of that force thought the reports stemmed principally from abuse of the rating system by buyers. With steel in heavy demand, producers are allotting steel. Customers are expected to keep defense-rated orders within or mostly within their total allotments.

Some buyers try to get all their allotments from their regular suppliers and then turn to other producers for defense-rated tonnages. The buyers are told to seek the defense-rated tonnages from their customary suppliers. This may have led to reports that defense-rated tonnages are being rejected.

The heavy demand for steel makes lead time highly important. Some holders of defense-rated orders may have expected lead time to be waived; disappointment in their expectations may have added to reports that rated orders are not getting proper attention.

The government may have underestimated the amount of tonnage the steel industry should set aside for defense-rated orders, compared with the tonnage on which ratings are applicable.

Ford and General Motors Employment

(by state) ▶

YES NO
NO YES NO YES
YES NO NO YES NO
YES NO YES
NO YES NO
CIO

FORD	
Total employment	180,000
Michigan	103,000
Ohio	19,000
Illinois	12,000
Missouri	8,000
New York	7,000
New Jersey	6,000
California	6,000
Texas	3,000
GENERAL MOTORS	
Total employment	479,000
Michigan	213,000
Ohio	82,000
Indiana	42,000
New York	35,000
Illinois	16,000
New Jersey	14,000
Kansas	11,000
Missouri	9,000
California	9,000
Wisconsin	7,000
Connecticut	6,000
Georgia	5,000
Maryland	4,000
Pennsylvania	3,000
Texas	3,000

In states not listed, employment is less than 3,000

SUP focus to switch to other states as . . .

Ohio Spurns CIO Proposal

WALTER Reuther's plans for Supplemental Unemployment Payments suffered a setback last week, when Ohio voters turned down a CIO-sponsored ballot to integrate state unemployment compensation with SUP and to hike the state benefit levels.

For the 1955 auto contracts to become effective, SUP must be integrated with public plans in states representing two-thirds of each auto company's employment by June, 1956. Mr. Reuther is reasonably sure of a favorable decision in Michigan. That, plus the Ohio vote, would have made the Ford contract good and would have taken care of most of GM's requirements.

Switch—The Michigan decision alone will handle Chrysler Corp.'s contract. Michigan has more than 80 per cent of Chrysler's hourly workers. But for Ford and GM, Mr. Reuther must turn his attack to other states. For Ford, it might take New York, Massachusetts and Illinois; for GM, New York, Connecticut, Indiana (see table).

Precedents favoring integration have been set in Michigan, New York, Connecticut, Delaware and Massachusetts. All of them can be fought in court. Now, it's more likely they will be. And labor observers point out that there is no definition of an acceptable integration ruling. Automakers have the contractual right to judge "acceptability" before any contract becomes effective.

The CIO proposal in Ohio was defeated 7 to 4. Mr. Reuther may plan to take just the integration proposal back to the Ohio legislature in January next year.

Alternatives — If Mr. Reuther can get sufficient coverage to put the contract into effect through the other states and without Ohio, he will be saddled with the job of finding a loophole in Ohio's law to permit autoworkers to draw company benefits. He could sell SUP on a nonintegrated basis to Ohio companies, under a contract patterned after that signed between the steelworkers and American Can Co. It wouldn't be easy.

Detroit Looks at Aluminum

Automakers are going back to the 1920s as they find new ways to save money and weight by using more aluminum in automobiles

AUTOMOBILES consumed half the total aluminum output in the 1920s. One 1923 model Pierce-Arrow had 85 per cent of it's weight in aluminum.

But in 1946 when aluminum output reached 800 million lb annually, two and a half times the prewar high, and the nation had 3 billion lb of wrecked airplane aluminum scrap, consumption per car dropped to 6 to 8 lb—an all-time low.

Today, the Cadillac Eldorado (see below) contains 192 lb of aluminum which replaces 400 lb or more of steel. Chrysler's Imperial contains 83 lb of aluminum, equivalent to more than 250 lb of ferrous parts, and the number of new uses for aluminum in cars is growing almost daily.

More Applications — In 1950, Clay Bedford of Kaiser-Frazer cited five applications of aluminum in passenger cars, totaling 62 lb. At that time there were 25 potential uses which would have weighed 281 lb.

Today, according to David P. Reynolds of Reynolds Metals Co., the number of actual uses has increased to 35, weighing 275 lb, though not, of course, on any one automobile.

As Mr. Reynolds sees it, there are 56 potential uses, weighing 434 lb. And the trend appears to be continuing upward even more rapidly than during the last five years.

Availability — Automakers consider aluminum today to be in short supply. General Motors Corp., for example, is reported fishing around for 150 million lb for 1956. But it also knows that aluminum is five times more prevalent on the surface of the earth on a volume basis than iron.

M. F. Garwood, chief materials engineer at Chrysler Corp., explains: This factor of availability cannot be ignored. It looms important in view of our expanding population and industrialization.

While problems attendant on the expansion of light metal production facilities are great, he feels confident that they will be solved, if only by supply and demand.

But Mr. Garwood cites a second important factor in the growth of aluminum's use in cars — it's adaptability to the high production, low-cost automation concept. And this, despite his observation that casting, extrusion and forging are presently the only fabrication areas where light metals can compete on a cost basis. He anticipates, however, that they will be able to compete in other fabrication fields in the future.

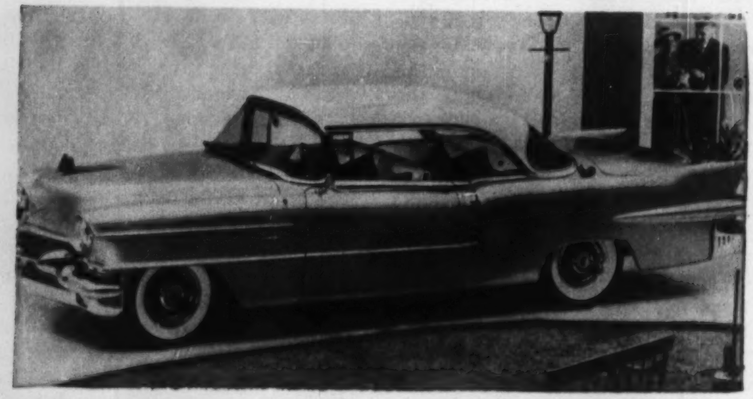
Advantages—Aluminum's touted virtues of light weight, corrosion resistance and high-thermal conductivity are only part of the story in the automakers' shift. Automakers, never phlegmatic when it comes to turning a buck, have discovered additional advantages, thanks to available fabrication methods.

Mr. Garwood cites the Chrysler torque converter housing as an example. The iron counterpart of the design, due to lack of coring and lighteners and greater section required by foundry sand practice, weighed almost five times as much as an aluminum housing, rather than the three times indicated by the specific gravity differential. In spite of this obvious saving in the cast state, it was in machining where greatest saving came.

That's because many machine operations were eliminated as a result of die-cast coring and close dimensional tolerances obtained. He reports that such simplification can result in savings as high as 75 per cent for machining costs and equipment investment.

Gate Crashing — Aluminum is making a concerted effort to get its wedge ever wider into the automotive door, and signs like these indicate it has a good chance of doing it.

When aluminum had its biggest slice of the automotive metal market, steelmakers working with auto firms produced a continuously annealed, deep-drawing sheet steel that speeded production and greatly lowered costs. In the ever-changing automotive materials picture, not even a trend is secure.



Cadillac's Eldorado uses 192 lb of aluminum in its construction

J&L Lets Electrical Contracts

Jones & Laughlin Steel Corp. has awarded electrical equipment contracts to Westinghouse Electric Corp. and General Electric Co.

Westinghouse will equip a blooming mill, universal roughing mill and two electric melting furnaces in J&L's expansion program at its Cleveland Works.

GE will provide equipment for J&L's 4-stand tandem cold reducing mill and other items at the Cleveland plant.

Freight Car Lack

It annoys metalworking but has not seriously hurt the industry. Trucks help out

"TOUCH AND GO" . . . "We've been lucky so far." Those are metalworking shippers' comments on the current freight car shortage.

"The situation is tight, but we're getting by," seems a fair consensus. Few traffic managers contacted by STEEL report shipments are held up by a lack of cars.

Unhappy — But that doesn't mean shippers are happy with present hand-to-mouth operation.

An early end of the tightness isn't looked for.

Mix-Up—The car supply situation varies greatly, even within relatively localized areas. One Pittsburgh area steel producer, for example, reports delay of outgoing shipments; another's shipments are moving O.K.

In the Midwest, a maker of agricultural machines says: "We're always short at one or another of our plants."

Getting By—A neighboring auto supplier which receives much incoming material by rail but ships relatively little out that way reports: "We're not bothered yet."

A Chicago steelmaker states: "We certainly aren't allowed to let cars sit around, but our operations haven't been hurt as yet."

Scrounging—A similar situation exists in Cleveland. Cars aren't plentiful, but steelmakers, auto plants and light manufacturers say they're at least holding their own. But one executive reports: "Many firms are scrounging."

The shortage may have given piggyback a small boost, along with increases resulting from growing popularity. Rail-Trailer Co., Chicago, says: "We have enough flatcars for our operations. We've had no trouble, see none ahead. Our piggyback loads in August were 1583; in September, 2200; October, 3400. It looks like November will be even better."

In general, manufacturers are a little better off than shippers of lumber, coal, grain and other crops—the car shortage is really pinching those industries.

MOTOR SHOW
AUSTIN
MG
ROVER
JAGUAR
CHEVROLET
SUNBEAM
CITROEN
MORRIS
Renault
SING
WOLSELEY
ARMSTRONG SIDDELEY
agonda
JENSEN

English carmakers aim at 1.2 million record this year as . . .

British Boost Auto Exports

THE LONDON MOTOR SHOW closed with manufacturers predicting the British will produce a record 1.2 million passenger cars and trucks this year.

Half a million Britons and 13,000 overseas buyers and visitors viewed some 300 late model cars from seven countries. The show (Oct. 19-29) was under the sponsorship of the Society of Motor Manufacturers & Traders (Great Britain).

Economy Mainstay—The automobile industry has been the main booster to Britain's economy since the war. Automobile output this year will exceed 1954's by 18 per cent; next year should see 1938 output nearly tripled.

By 1960, output is expected to reach 1.5 million. About 50 per cent will be for export. Automobile exports for the first eight months of this year were a record $235.2 million.

Dr. F. Llewellyn Smith, president of SMMT, referred to the export figures as: "Justifying once again, British motor industry's claim as the leading world exporter of motor vehicles."

Tighter Trade—Dr. Smith also explained: "Competition abroad is getting more intense, particularly in Western Europe. Western Germany, Italy and the U. S. are expanding their export efforts. On a smaller scale, Czechoslovakia and Eastern Germany, as well as Russia and Poland, are exporting more cars to Norway and Finland."

Despite tightening competition and a 20 per cent increased purchase tax, British motor manufacturers are going ahead with expansion plans.

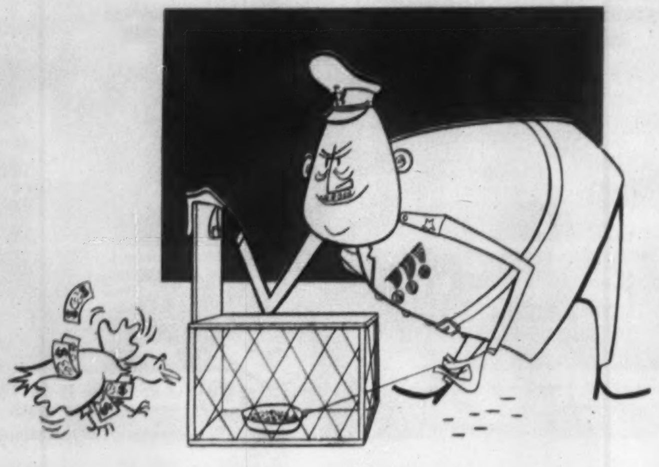
More Capacity — Vauxhall Motors, GM's English organization, is proceeding with a $100.8-million expansion which will boost its annual capacity to at least 250,000 passenger cars and trucks. Ford Motor Co. Ltd. of Great Britain is increasing its capacity at the cost of $182 million.

ODM Grants More Write Offs

The Office of Defense Mobilization issued 55 certificates of necessity between Oct. 6 and 19.

Fast write off grants for this period amounted to $507 million, making a total of $31.7 billion worth of certificates granted for 20,220 new or expanded facilities.

Railroads got a big percentage of latest period grants.



Higher prices have the military looking for . . .

More Dollars for Defense

THE DEFENSE DEPARTMENT is caught in the climbing price squeeze like many another buyer. So it's going a-hunting—for more money to spend in fiscal 1957.

Military spending in fiscal 1956 is estimated at about $34.5 billion—with considerable pressure for more.

Dashed Hopes—The administration had hoped to hold both spending and obligations at their present levels. But Defense's efforts at boosting efficiency and individual work loads haven't been enough to offset higher costs.

Without additional spending power, some defense programs may have to be cut back in the next fiscal year.

More—So it's almost certain the military will get a bigger slice of the federal melon next year. Also likely: The bigger slice won't be quite big enough; there may be some cutbacks.

One cutback is sure—this year. The Defense department will drop some 69,000 civilian employees between now and the end of the fiscal year, June 30. It's estimated that $100 million can be saved.

Layoffs—Guy C. Lee, manpower utilization chief, says about 23,000 civilians will be cut between now and the end of December. Another 23,000 will be dropped in each of the two following quarters.

Savings will make up part of the $500 million Defense Secretary Charles E. Wilson says can be saved if everyone follows the rules he laid down last month.

Defense Building — Also along that line, Reuben B. Robertson, deputy defense secretary, set up some guides for military construction spending. Emphasis on future building will be on operational needs and on critical facilities requiring long lead time.

To be chopped:

1. Industrial and commercial installations. Mr. Robertson says: "The general concept will be that existing facilities are ample."

2. Recreational and morale facilities (swimming pools, golf courses, educational wings to chapels) are out "unless exceptional circumstances exist."

3. Family housing. No appropriated funds will be used except for projects well advanced in planning, or if it's not possible to provide housing under Title VIII of the National Housing Act or other legislative programs.

New Look at Fair Trade

It looks like Fair Trade will get another airing next year. A Senate small business subcommittee headed by Sen. Hubert H. Humphrey (Dem., Minn.) sent some 1700 manufacturers a questionnaire on the subject.

Wanted is information on major problems of enforcing Fair Trade agreements and the probable effect on the firm if existing federal Fair Trade legislation is repealed. A similar question sheet will be sent retailers.

Aircraft, WOC Queries

Congress isn't finished with its investigation of the F3H Navy jet fighter—the one that cost the lives of four test pilots, plus $300 million of government money. The legislators are sure there was waste in the program. Still to be determined: Was there an undue amount of it?

WOCs are off the hook, temporarily, at least. The House's recent inquiry failed to show up any real wrongdoing. The subcommittee's report supposedly will charge that though the WOCs weren't shown to have specifically helped themselves, some actions were questionable since industry as well as government benefited.

Here and There

The Air Force is considering production stretchout of some aircraft. Already slated for slowdown is C-123 made by Fairchild Engine & Airplane Co. Other production schedules are being reviewed.

The Defense department would like to ask for more money for titanium research, but prospects aren't thought too bright because of other economies and cutbacks.

First figures from the 1954 Census of Business are coming out now, will continue through next year. It's the first new data on a lot of businesses since the 1948 project.

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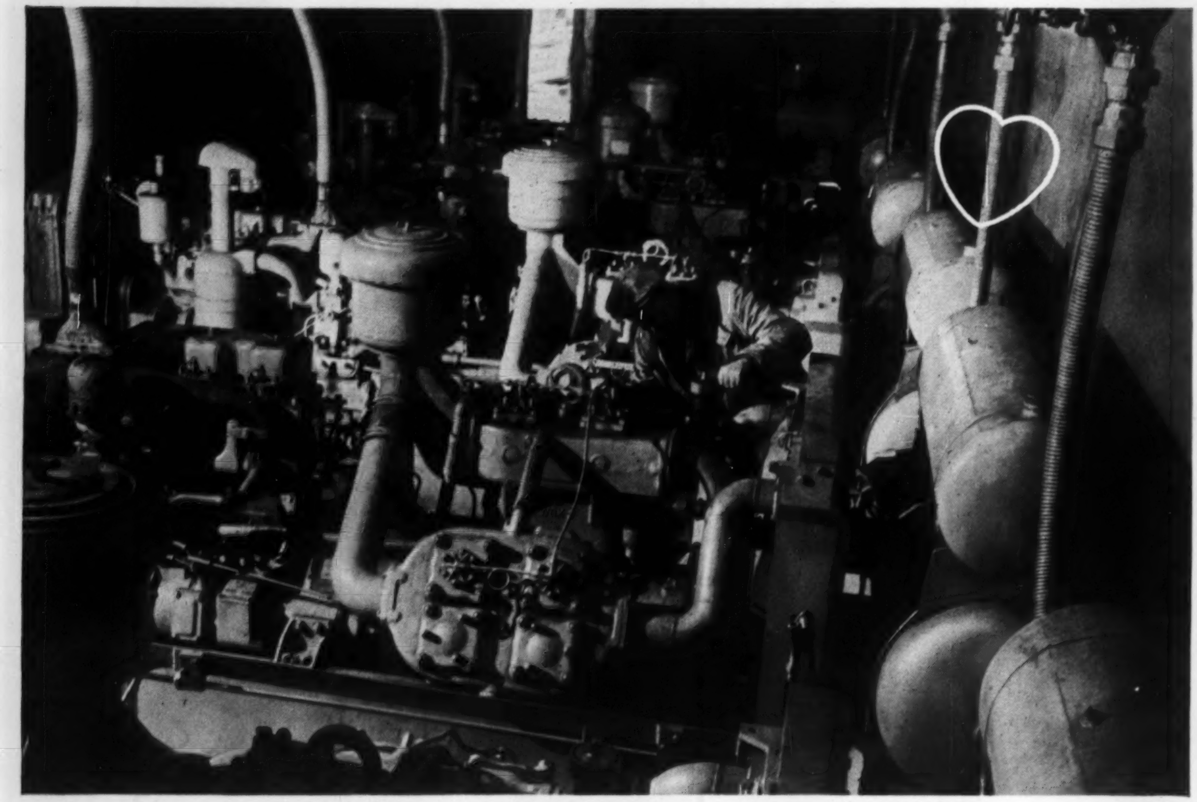

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"Transports air, but not the vibration" is remark often heard about Penflex tubing installed on air intake and exhaust lines. And for this room where a battery of eleven air compressors are operating, that can mean a lot of air in motion . . . and plenty of noise eliminated.

There's no question of air leakage, either. Penflex four-wall interlocked flexible tubing is as tight as the proverbial drum. In durability it has the edge over rigid pipe, for the many interlocked sections have a "give" which soaks up the minute but ceaseless vibration which causes ordinary pipe to fracture . . . in addition to absorbing an ear-splitting din.

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Penflex engineers will help you to "Flexineer"—one job or an entire plant—for steam or Diesel power generators, compressor stations, various oil, water and steam circulating lines, bulk unloading, or a host of other jobs.

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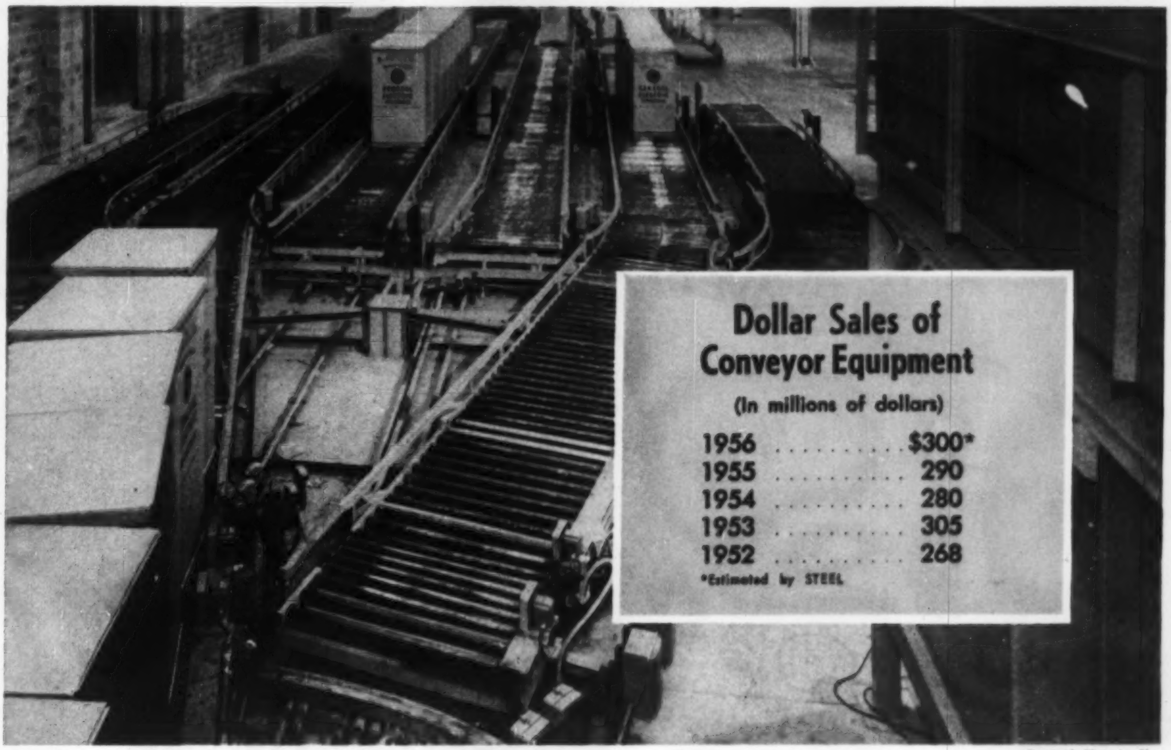


Dollar Sales of Conveyor Equipment

(In millions of dollars)

1956	$300*
1955	290
1954	280
1953	305
1952	268

*Estimated by STEEL

General Electric Co.

Emphasis on materials handling is reflected as . . .

Conveyor Sales Pick Up

CONVEYOR SALES are pulling out of the slump they were in last year.

Estimated dollar volume for this year is $290 million. Next year it may reach $300 million. These figures do not include cranes, hoists, monorail or farm elevator equipment.

By 1960, conveyor sales could recover to 1953's mark, or go even higher. Right now, the 175 major conveyor manufacturers say they are busy just keeping up with demands.

Basic Types—Almost all industries use at least one of 90 basic conveyor systems on the market, but no one industry dominates the field.

Special Engineering—Robert C. Sollenberger, executive vice president of the Conveyor Equipment Manufacturers Association, Washington, says: "Where heavier unit loads or bulk materials are involved, 90 per cent of the conveyor systems are specially engineered. Where lighter packages are concerned, the percentage is about 60.

"There is also a great trend toward 'do-it-yourself' equipment which can be bought off the shelf to handle light loads. These units can be used in many different industrial operations and can be adapted for day-to-day changes in production."

More and more companies are stocking component parts which can be assembled to meet needs of individual users.

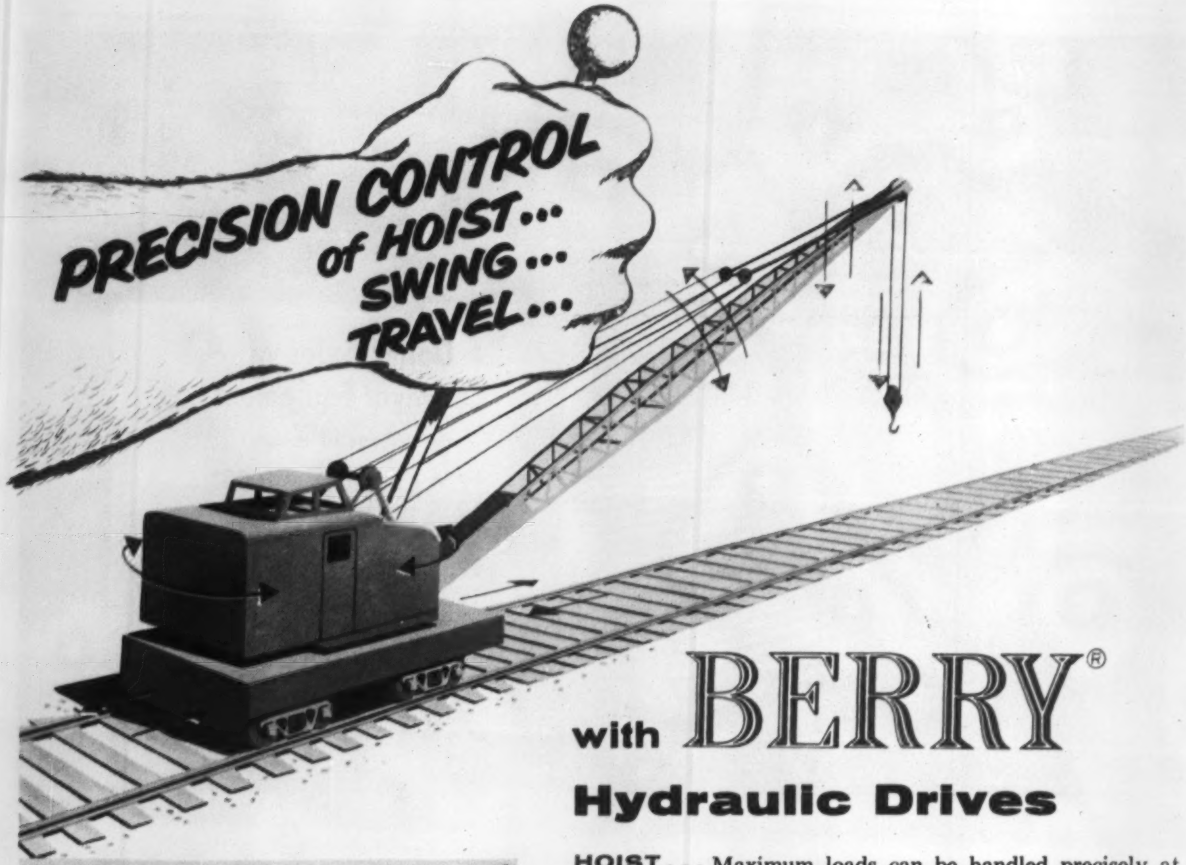
Handling Costs — Cleveland Crane & Engineering Co. cites a study showing the amount of handling involved in turning out foundry castings: "Where malleable iron castings are made, it is estimated that total handling involves 225 to 250 tons of material to produce 1 ton of castings weighing 1 lb each."

Labor costs of such handling can be terrific. It's one big reason why conveyor manufacturers feel their field will continue to grow as new and better ways of handling and conveying materials are found.

Applications—While basic types of conveyors have changed little over the years, new applications are being developed every day. Probably the greatest field now is the automotive industry, which is tending more and more toward completely automatic handling.

Electronic brains run conveyor systems in many plants. The systems automatically unload raw materials, convey them to storage and processing sections. After assembly, finished products are moved into packaging and shipping divisions.

Speaking about this trend, Mr. Sollenberger believes: "For the next few years there will be far more partial automation than full automation." In any case, most CEMA members feel the time is not far off when all plant materials will be handled by conveyors.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SWING...
TRAVEL...

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HOIST . . . Maximum loads can be handled precisely at minimum cost by using low *or* high engine speeds.

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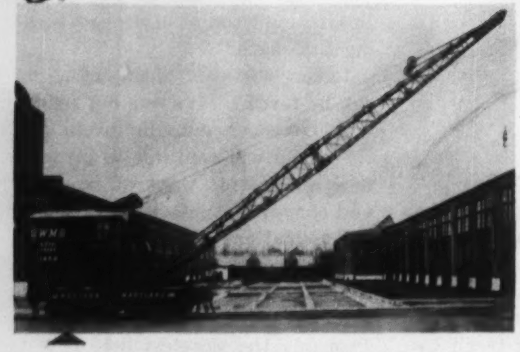
Simplicity . . . Utilization of the new Berry Pump and Motor Control Valves eliminates over 65% of the piping normally required in conversions and provides the maximum of Precision Control.

Experience . . . Major industrial firms and railroads in the United States and Canada are using cranes converted to Berry Hydraulic Drives. Write for location nearest you.



17½-Ton Brownhoist with Boom, Hoist and Travel supplied by a BERRY Drive for Western Maryland Railway Company.

10-Ton Unit Crane provided with Independent Swing by use of a BERRY Drive for The Milwaukee Road.

BERRY Model 32-10 3-place pump with BERRY Selector Valve mounted.

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Accelerated research spending boosts business as . . .

Scientific Apparatus Sales Step Up

SCIENTIFIC apparatus sales will hit about $400 million this year, up some 5 per cent from 1954. For next year, industrymen are betting on a new gain of as much as 15 per cent.

The rapid growth of electronics, high-flying business confidence and accelerated research spending by both industry and government are important elements of this confidence. As late as 1953, research spending hit $2.5 billion. Today, it's running at almost $4 billion.

Breakdown—Scientific apparatus sales are split into two main product groups. Laboratory apparatus, optical and industrial instruments form the first. The Scientific Apparatus Makers Association (SAMA), estimates that its members will sell some $214 million in this category by year end. The balance of the $400-million projection is made up from volume of the second product group (recorder-controllers, laboratory furniture and nautical and aeronautical instruments), and sales of non-SAMA members.

Close to 20,000 different products are marketed by the industry, not including some 15,000 chemical reagents and varying sizes of corks, stoppers and tubes. About 16,000 companies share the business. They don't have to be big to do a job, many boast fewer than 25 employees. And one man with highly specialized talent frequently founds a successful firm.

Key Industry—Dollarwise, scientific apparatus is no giant. By comparison, sales of Chicago's State street department stores run from $500 to $575 million each year. But the industry provides the tools for some 100,000 research engineers and scientists, who are responsible for sparking almost every technological advance made by American industry.

An increasing shortage of these technical people is viewed by apparatus makers as their biggest single problem. SAMA traces the cause to a shortage of high school science teachers, pointing out that some schools offer no instruction in laboratory science. The association is helping members attack this problem at the level of their own community.

Sales Outlook — Scientific apparatus firms, especially makers of optical instruments and precision analytical balances, are also troubled by import competition. Happily, however, these categories are among the sales leaders, together with instruments for electronic analysis, automatic process control and load cell weighing.

Longterm, the industry has no place to go but up. The spread of automation assures it solid bread-and-butter sales in quality control instrumentation. And for dessert, there are vast unexplored markets in the atomic energy and electronic fields.

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"J & L 1200" Steel provides the qualities that help machine operators do top-flight work at lower overall costs. With "J&L 1200," the operator obtains: better machine finishes . . . longer tool life . . . higher rates of speed. This fact has been proven time and again—in shop after shop.

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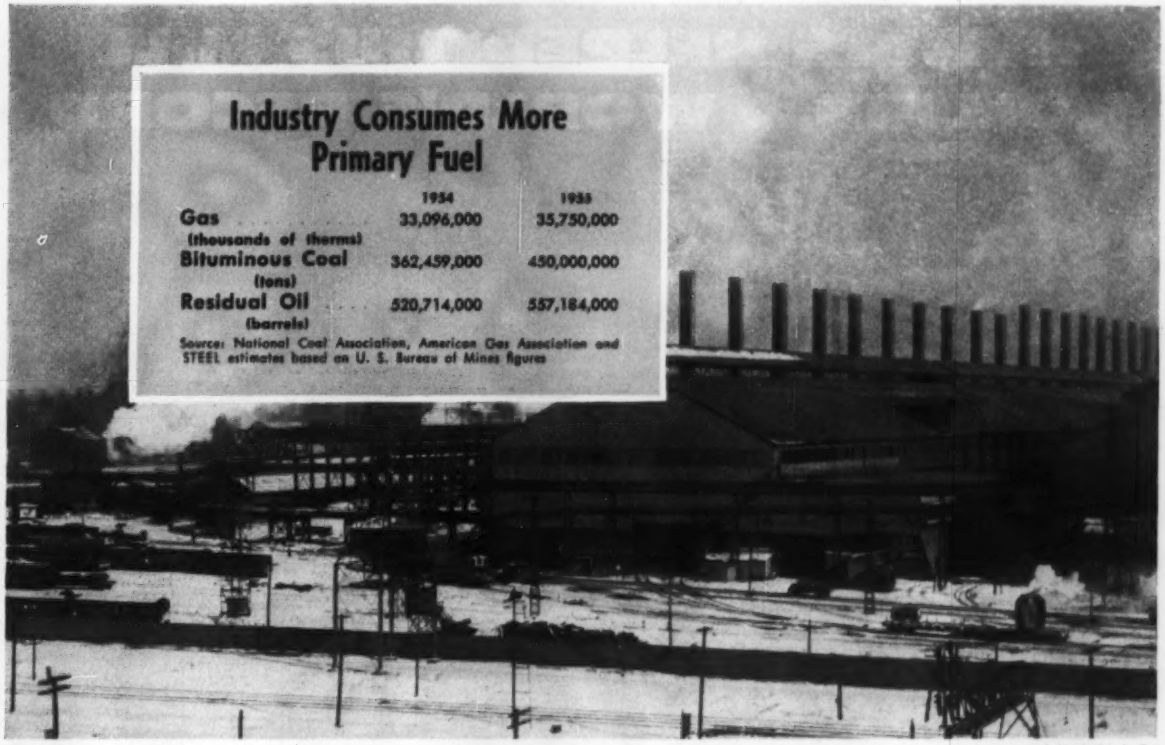

Industry Consumes More Primary Fuel

	1954	1955
Gas (thousands of therms)	33,096,000	35,750,000
Bituminous Coal (tons)	362,459,000	450,000,000
Residual Oil (barrels)	520,714,000	557,184,000

Source: National Coal Association, American Gas Association and STEEL estimates based on U. S. Bureau of Mines figures

Inland Steel Co.

No shortage, except in residual oil, this winter as . . .

Primary Fuels Get Set

IS THERE GOING to be a fuel shortage in the next few months? Answer: If the U. S. has a normal winter, coal supplies will be more than adequate; gas is preparing for additional expansion; but residual fuel oil may be on the critical list.

Bituminous coal advocates feel that "rock bottom" was hit last year (see table) and are hoping for a 450 to 455-million ton return for '55. To date, some 360 million tons have been produced. Export sales have helped, but most of the increased demand is coming from industry. U. S. Steel Corp. says its coal supply is adequate for the winter. Reason: The corporation does its own mining and has its own barges. One eastern steel company reports that a shortage of coal is developing in its area. Though not serious yet, mines serving this area have raised output only to find that there are not enough railroad cars to haul it away.

Gas and oil continues to press ahead, developing new markets and customers. Gas producers expect about an 8 per cent increase in use over last year. Residual fuel demand will rise 7 per cent.

Gas—The American Gas Association estimates that construction (replacement and expansion) in its industry for this year will call for the purchase of some 2.3 million tons of steel (2.2 million tons of the total is steel pipe), 221,000 tons of cast iron, 2192 tons of copper and 386 tons of aluminum. Construction in 1956, says the association, will see gas companies use 1.8 million tons of steel, 224,000 tons of cast iron, 2044 tons of copper and 157 tons of aluminum.

Oil — Pittsburgh Steel Co. explains that the shortage of barges is one factor in the tightening supply of residual oil. Most barge builders are having a difficult time getting plate and structural shapes to produce needed units. Pittsburgh Steel's opinion: The residual fuel oil shortage will not be critical unless the U. S. has an extremely cold winter.

Chicago—While residual fuel oil is not yet on the critical list, the Standard Oil Co. (Indiana) fire has seriously curtailed the Midwest's stockpile of residual oil for the winter. Wholesale distributors in this area will now be bidding for Gulf Coast oil.

Cleveland—Oil is tight and there is no let-up in sight. Distributors in this area will now be bidding against the Chicago area distributors for Gulf Coast oil.

Crux: There will be enough oil to go around, but transportation will be a serious threat. A prolonged winter, too, might cripple a number of steel plants as distributors feel that the lakes will have to open during the first part of April to keep industrial fuel oil flowing to eastern steelmakers.

HYATTS HELPED THIS MILL ROLL UP A WORLD'S RECORD

522 ingots in one 8-hour turn at J & L's Aliquippa Works!

The main table, approach table, runout table and lineshafting on this record-breaking 46″ Blooming Mill are equipped with HYATT Roller Bearings. Why? Because Jones & Laughlin, like so many leading steel producers, has found that the name HYATT is the hallmark of highest quality in roller bearings. It means expert engineering, fine fabrication and above all, *outstanding performance*—the ability to keep on absorbing punishment long after ordinary bearings have hit the scrap-heap!

No wonder HYATTS rate so well with J&L! If *you* want the same kind of record-breaking service from roller bearings, the man to see is as near as your telephone—your HYATT Sales Engineer. Give him a ring right now and let him give your production a lift! Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT

STRAIGHT BARREL TAPER

ROLLER BEARINGS

By FLOYD G. LAWRENCE *Detroit Editor*

Word of Caution on '56

The year's output should be high, but it's unlikely to surpass 1955's production of 8 million cars, despite current predictions to the contrary

THE TRADITIONAL morass of auto introduction parties noted for their spirited enthusiasm may find sales managers with a dandy hangover in 1956.

For as production gets back into the stride of earlier this year and dealers return to discounting, it's easier to recall the optimistic statements than the cars they concerned.

Rundown—General Motors Corp. division heads went on record as follows: Chevrolet's T. H. Keating forecasts car and truck output by his division at 2.53 million, compared with about 2.29 million this year. Pontiac's R. M. Critchfield predicts Pontiac will turn out 700,000 units, compared with 600,000 for 1955. Oldsmobile's J. F. Wolfram anticipates 750,000 units, compared with 625,000 for last year. Ivan Wiles of Buick expects production of 900,000 cars, against 800,000 this year; and Cadillac's sales manager, J. M. Roche, bets 156,000 cars come off their line, compared with 141,000 1955 models.

U. S. Auto Output

Passenger Only

	1955	1954
January	659,719	456,765
February ...	675,769	443,257
March	794,188	526,076
April	754,007	533,470
May	724,891	494,250
June	649,372	504,811
July	659,979	441,451
August	614,392	436,650
September ..	461,592	285,860
October	517,696†	236,635
November ..	......	508,466
December ..	......	641,971
Total	......	5,518,662
Week Ended	**1955**	**1954**
Oct. 8	80,271	63,925
Oct. 15	101,581	44,882
Oct. 22	137,425	45,649
Oct. 29	158,430	68,649
Nov. 5	174,672†	92,766
Nov. 12	180,000*	116,285

†Preliminary *Estimated by STEEL
Source: *Ward's Automotive Reports*

Ford Division's general sales manager, L. W. Smead, reports the division is producing at a rate of 2.5 million cars and trucks a year. Though he makes no prediction about 1956, any such figure would be at least a dozen units higher than anything Chevrolet predicted. Mercury Division's general sales manager, Joseph E. Bayne, estimates Mercury will increase sales to 450,000 from about 415,000 in 1955. Lincoln's Ben D. Mills says his division will notch 1 per cent of the industry total next year. That compares with perhaps 0.5 per cent now, or could indicate a doubling of output for next year.

Higher — Chrysler Corp. hasn't laid any numerical estimates on the line in the absolute volume department, nor have any of it's division heads. But L. L. Colbert, Chrysler Corp. president, reports that the firm will be shooting for 20 per cent of the industry total, compared with 18.1 per cent through August.

Talk of such gains comes in the face of output expected to top record 1950 by the end of November, and which should reach 8 million passenger cars by year end. Whether the gains will be realized depends in part upon the economic climate, and it's hard to find a man who doesn't think 1956 will be a good year.

Chrysler Kudo—Of the cars introduced, most are inclined to give Chrysler Corp. kudos on facelift flair for 1956. Its tooling bill of $175 million has produced more extensive appearance changes than most can claim. Whether the products will make a flight sweep of sales is a question to be answered, but the 1956 versions definitely can be distinguished from the 1955's and set a trend which will be picked up by most manufacturers in all-new 1957 models.

Chrysler also scores with push-button shifting on automatic transmission jobs. Actuating a shift cable which mechanically selects the gear just as the lever formerly did, this device is a logical development rather than just a gimmick, though it hardly ranks with the invention of the wheel. It will be an industry feature in 1957.

GM Shifts — Transmissions are big news on GM products in 1956. Pontiac, Oldsmobile and Cadillac offer a revised Hydra-Matic incorporating a second turbine which empties and fills to govern torque during shifts. This transmission is highly effective in cushioning shift-jerks for normal drivers, though the lead-foot boys will discover they can still jar their passengers if they work at it. Performance remains high, and the new Hydra-Matic ranks as a concession to smoothness and not a compromise.

Still the old smoothie is Dynaflow—this year with an additional stator to direct the oil flow for greater performance. The result is most impressive, and, coupled with the horsepower hike, this year's Special model will embarrass the boys in last year's Century jobs. Changes in the front suspension and double - acting shock absorbers in the rear make the 1956 Buick a substantially different animal than the 1955.

Safe Ford—Ford products are hitting safety hard, in addition to style and horsepower hikes—like GM changes, no small stuff, but of consequences which are more easily observed than predicted. Almost a cinch to make its quota, however, is Lincoln, which offers

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a restyled job to recover the sales traction lacking in 1955.

Stimulating Independents—Among the Independents, Packard certainly offers a stimulating machine for 1956, incorporating the limited slip differential, pushbutton shifting and torsion level ride. The Studebakers to be introduced day after tomorrow also will be acclaimed by many with major front and rear restyling that gets the cars back into the contemporary design school with a bang. Also a car to watch will be the Rambler, which gets top style billing among many of the newsmen. The degree of change on the Hudson is comparable to that on the Nash just introduced. Kaiser and Willys, as predicted about a year ago in STEEL, will be out of the passenger car field in 1956.

1957 Models—The 1956 models will not parallel calendar year of 1956. A stream of all-new 1957 models will hit the road shortly after the middle of next year, since most manufacturers are planning to introduce from one to two months earlier than this year. A major contributor to the 1956 sales picture will be the really giddy 1957 jobs. Coupled with usual spring buying spurt, 1956 seems assured of being the third-best year at worst and perhaps even better.

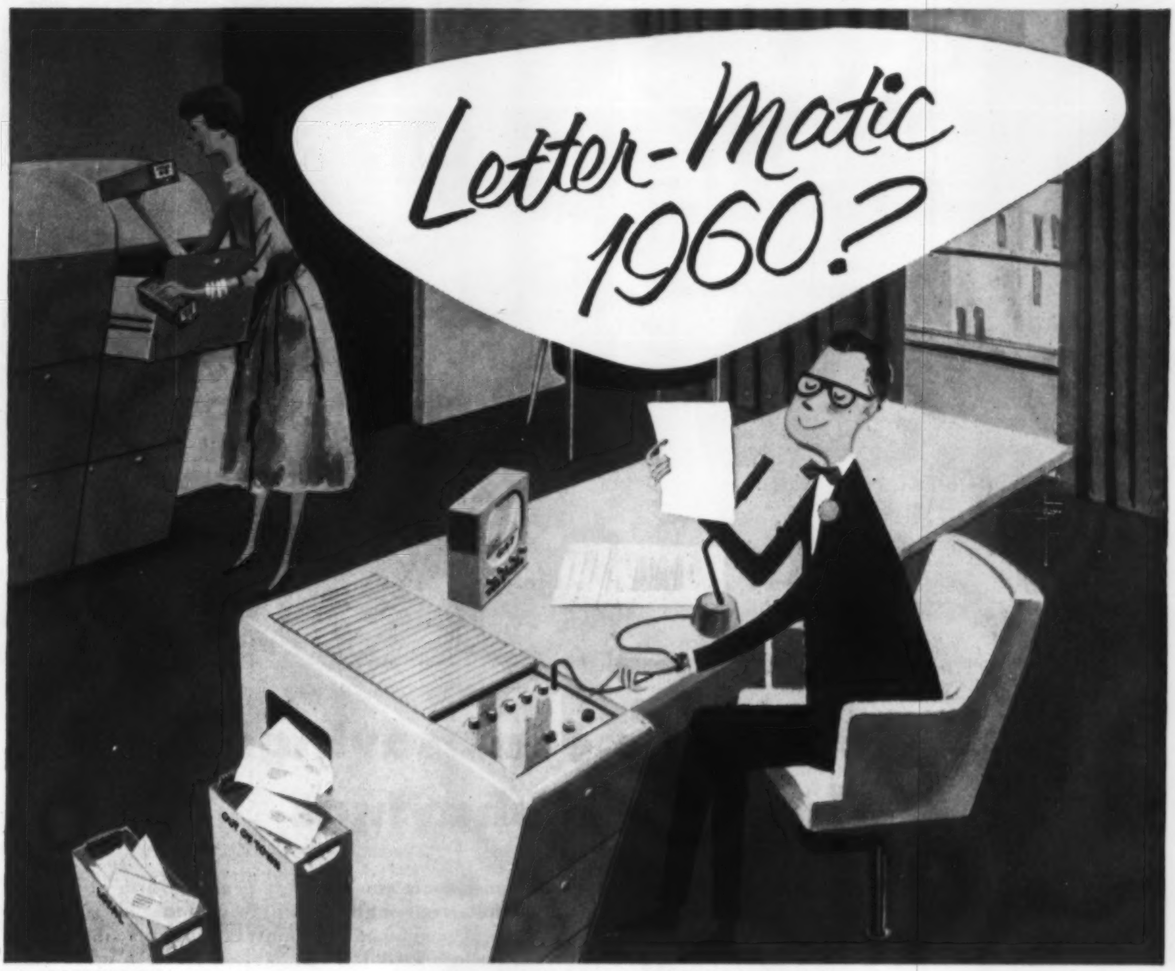
The chart below may help you decide when you like to become part of the statistics.

'56 4-DOOR SEDANS—WHAT YOU GET FOR YOUR MONEY

MAKE	SPECIFICATIONS							COST OF OPTIONAL EQUIPMENT							
	Price	Wheel-base	Length	Weight (shipping)	Max. hp at rpm	Compr. Ratio	Engine Type	Over-drive	Auto. Trans.	Power Steer.	Power Brakes	Radio	Heater & Defroster	Power Package hp @ rpm	Power Package Cost
CHEVROLET															
150 Series	$1,675	115	197.5	3220	140/4200	8:1	OHV-6‡	$100.00	$175.00	$85.00	$35.00	$63.50	$42.00	NO	NO
210 Series	1,755	115	197.5	3293	170/4400	8:1	V-8	100.00	175.00	85.00	35.00	63.50	42.00	205/4600	$30.00
Bel Air	1,860	115	197.5	3293	170/4400	8:1	V-8	100.00	175.00	85.00	35.00	63.50	42.00	205/4600	30.00
PONTIAC															
Chieftain 860	2,060	122	205.6	NA	205/4600	8.9:1	V-8	NO	175.00	100.00	35.00	84.50	83.50	227/4800	28.50
Chieftain 870	2,167	122	205.6	NA	205/4600	8.9:1	V-8	NO	175.00	100.00	35.00	84.50	83.50	227/4800	28.50
Star Chief	2,273	124	212.6	NA	227/4800	8.9:1	V-8	NO	190.00	100.00	35.00	84.50	83.50	NO	NO
OLDSMOBILE															
88 Series	2,226	122	203.29	3761	230/4400	9.25:1	V-8	NO	204.50	107.50	39.80	102.60	82.35	NA	NA
Super 88 Series	2,363	122	203.29	3897	240/4400	9.25:1	V-8	NO	204.50	107.50	39.80	102.60	82.35	NA	NA
98 Series	2,969	126	212.29	4047	240/4400	9.25:1	V-8	NO	204.50	107.50	39.80	102.60	82.35	NA	NA
BUICK															
Special	2,166	122	206.7	3790	220/4400*	8.9:1	V-8	NO	204.30	107.50	38.70†	95.70	85.00	NO	NO
Century	2,717	122	206.7	4000	255/4400*	9.5:1	V-8	NO	Std.	107.50	38.70†	95.70	85.00	NO	NO
Super	2,927	127	216.0	4200	255/4400*	9.5:1	V-8	NO	Std.	Std.	38.70†	95.70	85.00	NO	NO
Roadmaster	3,148	127	216.0	4280	255/4400*	9.5:1	V-8	NO	Std.	Std.	38.70†	95.70	85.00	NO	NO
CADILLAC															
Series 62	3,903	129	214.9	NA	285/4600	9.75:1	V-8	NO	Std.	Std.	Std.	142.70	128.85	305/4700	161.10
Fleetwood 60	4,587	133	225.9	NA	285/4600	9.75:1	V-8	NO	Std.	Std.	Std.	142.70	128.85	305/4700	161.10
Fleetwood 75	6,040	149.75	235.7	NA	285/4600	9.75:1	V-8	NO	Std.	Std.	Std.	142.70	128.85	NO	NO
PLYMOUTH															
Plaza Series	1,726	115	204.8	3145	125/3600	7.6:1	LH-6‡	107.70	183.70	80.80	40.20	89.90	75.40	131/3600	10.80
Savoy Series	1,818	115	204.8	3295	180/4400	8:1	V-8	107.70	183.70	80.80	40.20	89.90	75.40	200/4400	44.65
Belvedere Series	1,896	115	204.8	3325	187/4400	8:1	V-8	107.70	183.70	80.80	40.20	89.90	75.40	200/4400	44.65
Sport Suburban Series	2,244	115	209.0	3605	187/4400	8:1	V-8	107.70	183.70	80.80	40.20	89.90	75.40	200/4400	44.65
DODGE															
Coronet 6	2,029	120	212	NA	131/3800	7.6:1	LH-6‡	102.30	183.70	NO	37.70	76.80	79.65	NO	NO
Royal V-8	2,257	120	212	NA	189/4400	7.6:1	V-8	102.30	183.70	91.50	37.70	76.80	79.65	NO	NO
Custom Royal V-8	2,359	120	212	NA	218/4400	8.0:1	V-8	102.30	183.70	91.50	37.70	76.80	79.65	230/4400	214.00
DeSOTO															
Firedome	2,393	126	217.9	3855	230/4400	8.5:1	V-8	100.00	175.00	90.00	37.00	92.80	76.20	NO	NO
Fireflite	2,803	126	217.9	4005	255/4400	8.5:1	V-8	100.00	175.00	90.00	37.00	92.80	76.20	NO	NO
CHRYSLER															
Windsor	2,565	126	219.9	3900	225/4400	8.5:1	V-8	NO	175.00	90.00	37.00	92.80	76.20	250/4600	75.00
New Yorker	3,402	126	221.2	4110	280/4600	9.0:1	V-8	NO	Std.	90.00	Std.	92.80	76.20	NO	NO
Imperial	4,381	133	229.6	4565	280/4600	9.0:1	V-8	NO	Std.	Std.	Std.	92.80	76.20	NO	NO
FORD															
Mainline	1,699	115.5	198.5	3127	137/4000	8.0:1	OHV-6‡	109.70	178.20	53.30	39.00	76.60	71.44	NO	NO
Customline	1,785	115.5	198.5	3258	176/4400*	8.4:1	V-8	109.70	178.20	53.30	39.00	76.60	71.44	NO	NO
Fairlane	1,871	115.5	198.5	3290	176/4400*	8.4:1	V-8	109.70	178.20	53.30	39.00	76.60	71.44	NO	NO
MERCURY															
Custom	2,157	119	206.4	3520	215/4600*	8.4:1	V-8	102.00	175.35	75.00	35.00	89.50	75.00	NO	NO
Monterey	2,292	119	206.4	3570	225/4600*	9:1	V-8	102.00	175.35	75.00	35.00	89.50	75.00	NO	NO
Montclair	2,507	119	206.4	3610	225/4600*	9:1	V-8	102.00	175.35	75.00	35.00	89.50	75.00	NO	NO
LINCOLN															
Premiere	4,183	126	222.8	4450	285/4600	9:1	V-8	NO	Std.	Std.	45.67	126.00	125.33	NO	NO
Capri	3,821	126	222.8	4450	285/4600	9:1	V-8	NO	Std.	Std.	45.67	126.00	125.33	NO	NO
NASH															
Statesman	NA	114¼	202¼	3170	130/4500	7.44:1	OHV-6	NA	NA	NA	NA	NA	NA	NO	NO
Ambassador	NA	121¼	209¼	3570	135/3700	7.6:1	OHV-6‡	NA	NA	NA	NA	NA	NA	NO	NO
PACKARD															
Patrician	4,160	127	218.5	4355	290/4600	10:1	V-8	NA	NA	NA	NA	NA	NA	NO	NO
Packard 400	4,190	127	218.5	4355	290/4600	10:1	V-8	NA	NA	NA	NA	NA	NA	NO	NO
Clipper Custom	3,069	122	214[illegible]	3915	270/4600	9.5:1	V-8	NA	NA	NA	NA	NA	NA	NO	NO
Clipper Super	2,866	122	214[illegible]	NA	240/4600	9.5:1	V-8	NA	NA	NA	NA	NA	NA	NO	NO
Clipper Deluxe	2,731	122	214[illegible]	3700	240/4600	9.5:1	V-8	NA	NA	NA	NA	NA	NA	NO	NO

* With automatic transmission. † Available only on Dynaflow-equipped cars. ‡ V-8 engine available. NO not offered. NA not available. Prices are factory retail prices including federal excise tax, handling and distribution charges but exclusive of state and local taxes and transportation charges.

NEW DEPARTURES OF TOMORROW



TOMORROW: You dictate! The machine types and hustles your letters to the mail. Electronics does it all.

Think of dashing through your correspondence with this imaginary scribe! It converts your voice into electronic impulses which type, micro-record, fold, insert, seal, address and stamp letters almost as fast as you can dictate!

It's just a notion now! But when some foresighted engineer works it out, you can bet New Departure will be called in to design the right ball bearings to keep these intricate parts working smoothly. New Departure works with engineers right from the planning stage to develop the exact bearing for even the newest departure in design.

Whether you're planning a new product or redesigning an old one, call on New Departure. You'll benefit from a half-century of experience.

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT

TODAY: In dictating instruments, New Departure ball bearings contribute to compactness of design and operating efficiency. They hold moving parts in alignment—reduce wear—require no upkeep.

NEW DEPARTURE
BALL BEARINGS
NOTHING ROLLS LIKE A BALL

This hole means savings —instead of shavings

THE hole in the tube above should have been packed full of money. It would have been a quick way to show you some of the money you'll save when you switch to Timken® seamless steel tubing for your hollow parts jobs.

Because the hole's already there, you eliminate practically all of the scrap you have to drill out when you use bar stock—the steel you pay for but don't use.

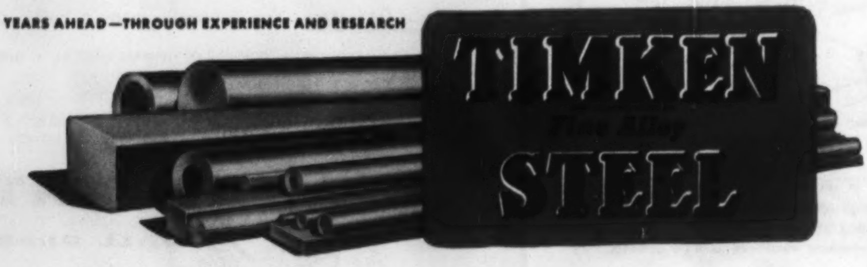
Because the hole's already there, you can start with finish boring. You can make your hollow parts faster, with less equipment and fewer production steps.

Because the hole's already there, screw machine stations and men are available for other operations. You add machine capacity without adding machines. You use your employees more efficiently.

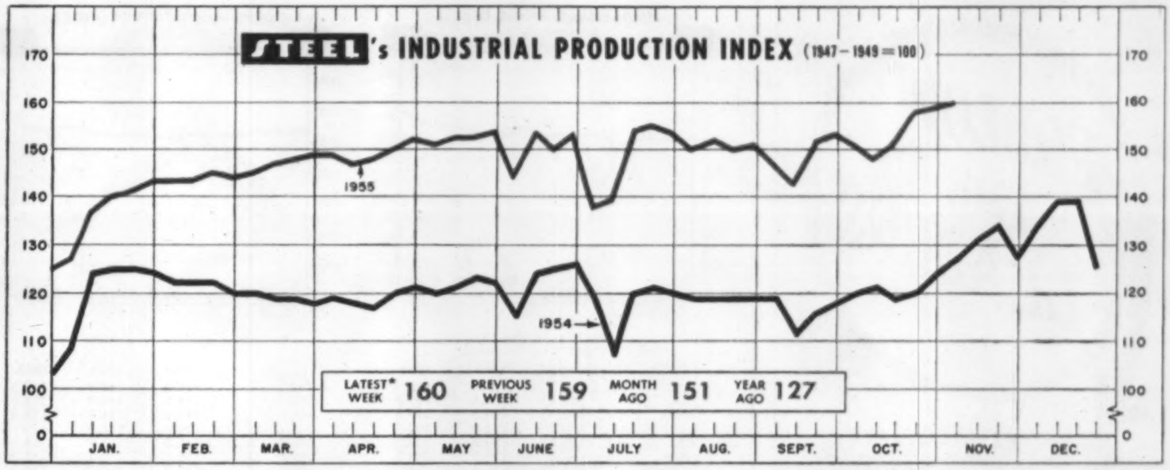
To make sure you get every penny's worth of steel for your dollar, our engineers will be glad to study your operation and recommend the most economical tube size for your hollow parts job—guaranteed to clean up to finish dimensions.

Timken seamless steel tubing gives you a better quality product, too. The piercing operation by which it's made is basically a forging operation. This gives the tubing a uniform spiral grain flow and a refined grain structure that brings out the best in the quality of the metal. And this quality is uniform from tube to tube and heat to heat because of the Timken Company's rigid quality control. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING



*Week ended Nov. 5. Based upon and weighted as follows: Steel Output, 35%; Electric Power Output, 32%; Freight Car Loadings, 22%; and Auto Assemblies, 11%

Steel, Autos Pace Industrial Production

STEEL's industrial production index has touched the magic 160 mark (1947-1949 = 100), an all-time record. The latest week was just a shade under, at 159, but when preliminary figures are revised it also should tap the 160 line.

What it means is this: Steel, autos and electrical output are at record or near-record levels. Railroad freight car loadings are chugging along at their hottest pace since 1952.

Sugar and Spice—Since all four factors are regarded as good indicators of the way over-all business is going, the picture looks rosy.

Take steel, for example. Output last week was estimated at 2.37 million net tons by the American Iron & Steel Institute. That's 98.3 per cent of capacity. The week before, steel production was 2.40 million tons, or 99.4 per cent of capacity. Steel output in recent weeks has been just about one and one-half times what it was in an average week of 1947-1949. It should hold about there until the slowdown for Christmas holidays; demand shows no letup.

Delayed Pickup — Automakers have the throttle flat to the floor but haven't hit top speed. Production kinks are holding back a number of makes.

When the bugs get ironed out, watch 'em fly. Combined auto-truck output is already past 200,000 a week. Only nine weeks had previously surpassed that total.

Good Sales News—As it is, output is best since last May. The all-time weekly high was recorded in the final week of April when 216,629 cars and trucks came off the lines of U. S. plants, according to *Ward's Automotive Reports.*

There's little reason to expect any slowdown between now and year end. Early sales reports are highly encouraging—and besides, there's the "sold most" races, Chevvy vs. Ford for first place, and Buick vs. Plymouth for third.

Also inflating STEEL's produc-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,372[1]	2,400	1,874
Electric Power Distributed (million kw-hr)	10,640[1]	10,659	9,152
Bitum. Coal Output (1000 tons)	9,965	9,800	9,203
Petroleum Production (daily avg—1000 bbl)	6,740[1]	6,750	6,153
Construction Volume (*ENR*—millions)	$394.0	$295.2	$287.1
Auto, Truck Output, U. S., Canada (*Ward's*)	207,058[1]	188,283	116,575
TRADE			
Freight Car Loadings (1000 cars)	832[1]	835	736
Business Failures (Dun & Bradstreet, no.)	210[1]	230	223
Currency in Circulation (millions)[3]	$30,528	$30,498	$30,138
Dept. Store Sales (changes from year ago)[3]	+8%	+8%	+4%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$22,522	$21,113	$19,220
Federal Gross Debt (billions)	$279.826	$280,033	$278,789
Bond Volume, NYSE (millions)	$17,019	$18,766	$14,396
Stocks Sales, NYSE (thousands of shares)	9,695	8,992	10,561
Loans and Investments (billions)[4]	$85,571	$85,542	$84,789
U. S. Govt. Obligations Held (billions)[4]	$30,922	$30,941	$37,533
PRICES			
STEEL's Finished Steel Price Index[5]	208.90	208.90	194.53
STEEL's Nonferrous Metal Price Index[6]	264.4	264.1	218.3
All Commodities[7]	111.0	111.1	109.9
Commodities Other than Farm & Foods[7]	118.7	118.7	114.5

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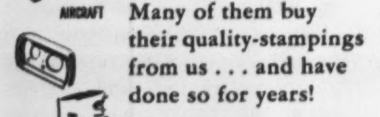
*Dates on request. [1] Preliminary. [2] Weekly capacities, net tons: 1955, 2,413,278; 1954, 2,384,549. [3] Federal Reserve Board. [4] Member banks, Federal Reserve System. [5] 1935-1939 = 100. [6] 1936-1939 = 100. [7] Bureau of Labor Statistics Index, 1947-1949 = 100

REFRIGERATION
AIRCRAFT
PHOTOGRAPHIC
ELECTRICAL
AUTOMOTIVE
HEATING—VENTILATING



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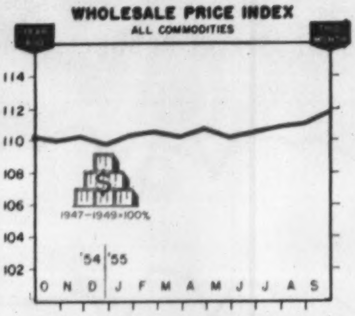
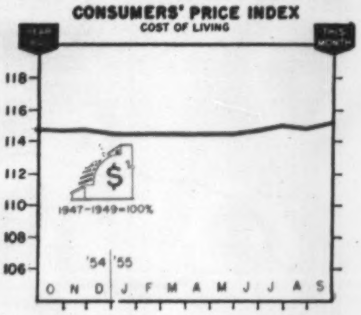
THE BUSINESS TREND



	1955	1954	1953
Jan.	110.1	110.9	109.9
Feb.	110.4	110.5	109.6
Mar.	110.0	110.5	110.0
Apr.	110.5	111.0	109.4
May	109.9	110.9	109.8
June	110.3	110.0	109.5
July	110.5	110.4	110.9
Aug.	110.9	110.5	110.6
Sept.	111.6*	110.0	111.0
Oct.	....	109.7	110.2
Nov.	....	110.0	109.8
Dec.	....	109.5	110.1

U. S. Bureau of Labor Statistics
*Preliminary

Charts copyrighted, 1955, STEEL



	1955	1954	1953
Jan.	114.3	115.2	113.9
Feb.	114.3	115.0	113.4
Mar.	114.3	114.8	113.6
Apr.	114.2	114.6	113.7
May	114.2	115.0	114.0
June	114.4	115.1	114.5
July	114.7	115.2	114.7
Aug.	114.5	115.0	115.0
Sept.	114.9	114.7	115.2
Oct.	....	114.5	115.4
Nov.	....	114.6	115.0
Dec.	....	114.3	114.9

U. S. Bureau of Labor Statistics

tion index is electrical output. It's over 10.6 billion kilowatt-hours weekly, double what it was back in 1947 to 1949. Here's another figure due to rise some more. Mostly responsible: More dark, dreary late fall days which mean lights go on earlier.

Railroads Come Back . . .

The fourth factor in the production index is freight car loadings. They were sort of a poor relation during most of the index's rise. They're beginning to pull their own weight as the index continues upward.

Even so, loadings are barely above the 1947-1949 average, indicating the railroads have a good bit to go if they are going to keep pace with a rapidly expanding economy.

Holding loadings down somewhat is a tight supply of cars (see page 65). But even with ample cars, loadings would still come nowhere near the gains racked up by steel, autos and electric output.

Higher loadings do make railroad profits look better. Estimated net income of 130 Class I railroads was $80 million in September, compared with $59 million in that month last year, says the Association of American Railroads. For the first nine months of this year net income is $661 million, half again as much as in the same period of 1954.

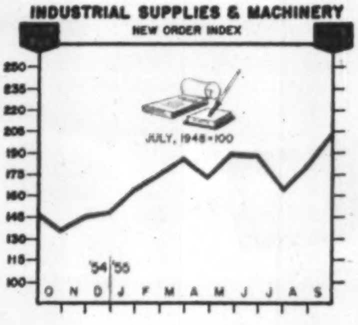
Prosperity in Technicolor . . .

Commerce Secretary Sinclair Weeks observes: "The economy is in the pink of condition . . . Old Man Prosperity 'just keeps rolling along.' "

He sees: 1. Construction hitting about $42 billion this year—that's 10 per cent above last year's record. 2. The number of adult workers in October at a new high. 3. Best Christmas sales in history for retailers. 4. Possibility of capital spending soaring to a new record rate in 1955's last two quarters.

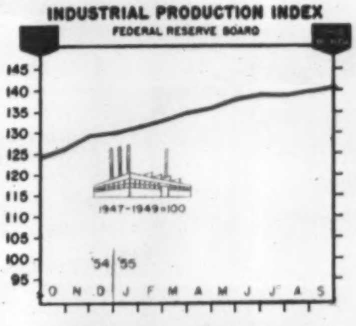
The Committtee of Technical Consultants—14 leading industry economists—believes "pretty unanimously that 1956 will show a higher rate of activity than 1955," reports Mr. Weeks.

"Some members do foresee a modest slide-off in the second half of 1956 following an inventory build-up, but still with each quarter higher than in the corresponding quarter of 1955. Others, however, doubt that the second half of 1956 will show any decline."



		1955	1954	1953
Jan.	......	164.4	139.8	157.4
Feb.	......	175.1	140.5	172.9
Mar.	......	186.9	141.5	188.2
Apr.	......	173.7	131.9	182.1
May	......	191.6	129.4	171.1
June	......	189.1	136.4	160.0
July	......	163.7	119.4	155.3
Aug.	......	181.2	132.5	139.6
Sept.	......	203.2	148.1	150.6
Oct.	......	....	136.3	146.0
Nov.	......	....	146.2	144.8
Dec.	......	....	148.8	136.7

Amer. Supply & Machinery Mfrs.' Assn.



(seasonally adjusted)

	Total Production		Primary Metals		Metal Fabricating	
	1955	1954	1955	1954	1955	1954
Jan.	131	125	127	111	156	155
Feb.	133	124	131	108	157	152
Mar.	135	123	135	103	158	148
Apr.	136	123	138	104	160	146
May	138	124	140	106	162	147
June	139	124	143	108	163	145
July	139	124	134	104	167	148
Aug.	140	123	139	105	170	148
Sept.	141*	124	146*	117	171*	148
Oct.	...	126	...	110	...	149
Nov.	...	129	...	118	...	155
Dec.	...	130	...	120	...	156
Avg	...	125	...	110	...	150

Federal Reserve Board. *Preliminary

Report on Building . . .

Supporting Secretary Weeks' contention that spending for new construction will set a record this year are October outlays pegged at $3.9 billion by the Commerce and Labor departments.

That's 11 per cent above the old peak for the month set last year. It brings spending this year over $35 billion, 13 per cent higher than at this time in 1954, the record year.

October totals, though, were down about 3 per cent from September's—mostly a result of the September dip in housing starts. On the brighter side: Industrial and commercial building continue to expand, breaking all previous records.

Inventories: Relatively Low . . .

One of the nation's better known economists, Martin Gainsbrugh of the National Industrial Conference Board, predicts: "Economic activity should rise even further in the next several quarters as the automobile industry begins to market 1956 models."

Other expansionary factors are: The rising trend of private investment in new plants and equipment; continued growth in state and local outlays; prospects of higher tax yields and possibly further tax relief.

In machinery industries, the uptrend of the last six months will apparently be maintained in the current quarter, Mr. Gainsbrugh told the National Tool & Die Manufacturers Association convention.

The level of business inventories even after several quarters of build-up still appears low relative to current operating rates in most manufacturing industries, he noted.

Trends Fore and Aft . . .

"Sales, unfilled orders and incoming business continue at a rate well in excess of last year," says R. W. Porter, treasurer, Van Norman Co. . . . Commercial heat treaters had their best month of 1955 in September, reports Metal Treating Institute. Business over the year is now 13.4 per cent ahead of 1954's . . . "At Sept. 30, unfilled orders for machines amounted to $14.0 million, compared with $12.0 million at June 30 and $3.8 million at Jan. 1," say top officers of Bucyrus-Erie Corp., W. W. Coleman and W. L. Litle.

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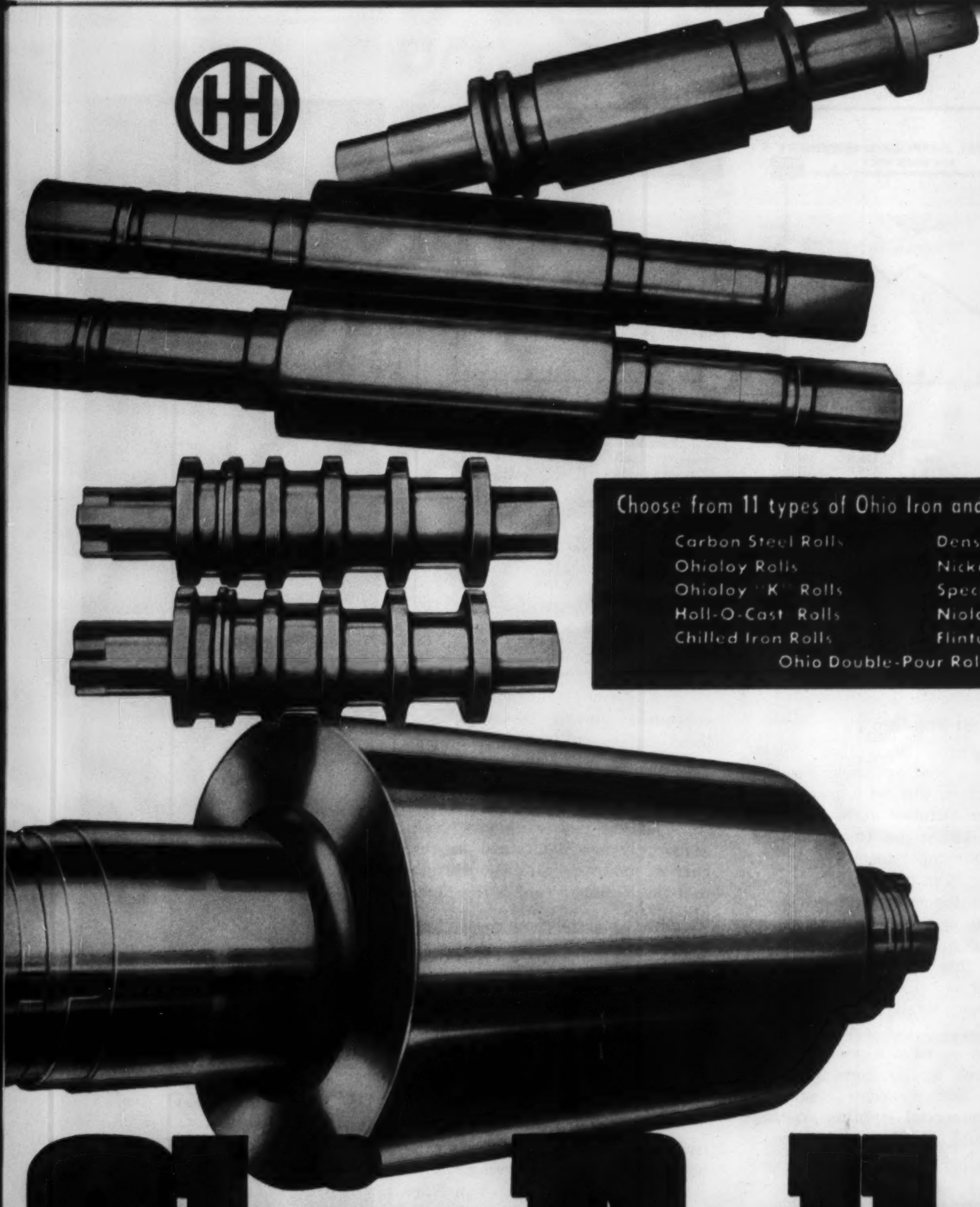
Balls

CHROME ALLOY
AND
STAINLESS

COOLIDGE CORPORATION
MIDDLETOWN, OHIO



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THE OHIO STEEL FOUNDRY CO.

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SAMUEL H. GREENWOOD
. . . F. J. Stokes field sales mgr.

NEAL J. CRAIN
. . . United Eng. & Foundry v. p.

Neil J. Ranney was elected president of **Production Machinery Corp.,** Mentor, O., a new firm specializing in job-engineered machinery for coils, sheet and strip. He was director of engineering and purchasing at Wean Equipment Corp.

John N. VanEpps was elected vice president-manufacturing, **Madison Mfg. Co.,** Muskegon, Mich., and **Madison Industries Inc.,** Big Rapids, Mich. He was contract sales manager for Universal Winding Co.

Brinton Welser was elected senior vice president, **Chain Belt Co.,** Milwaukee. **J. Clifford Merwin** retires as chairman of the board.

James R. MacDonald was elected chairman of **General Cable Corp.,** New York. He continues as president.

John Newitt was made general manager of **Kinetics Corp.,** Hingham, Mass.

Pesco Products Division of Borg-Warner Corp. at Bedford, O., appointed **H. Charles Yaeger** manager of manufacturing and **Donald R. Spotz** general sales manager. Mr. Yaeger was factory manager of Jacobs Aircraft Engine Co. Mr. Spotz was sales manager, accessories division, Thompson Products Inc.

Samuel H. Greenwood was made field sales manager for **F. J. Stokes Machine Co.,** Philadelphia. He is succeeded as district manager of the Philadelphia territory by **Fred Hillsley.**

Robert M. Gordon, former sales manager, air impeller division, Torrington Mfg. Co., returns to **Milford Rivet & Machine Co.,** Milford, Conn., as general sales manager.

George F. Hagger was made director of engineering for **Snap-Tite Inc.,** Union City, Pa. He was director of engineering at Aero Supply Mfg. Co. Inc.

Harold E. Schlenker and **John W. Vanek** were promoted to vice presidents of **Accurate Die Casting Co.,** Cleveland, in charge, respectively, of sales and engineering.

Richard A. Stumm was elected a vice president of **U. S. Industries Inc.,** New York. Mr. Stumm is president of Southern Pipe & Casing Co. near Azusa, Calif., recently acquired by U. S. Industries.

James Tate fills the new post of assistant to the president of **A-P Controls Corp.,** Milwaukee.

Leonard T. Harris is assistant sales manager in **Kensington Steel Co.'s** Chicago office.

Neal J. Crain was elected vice president-purchases, **United Engineering & Foundry Co.,** Pittsburgh. He has served as director of purchases since 1951.

James F. Rafferty was made vice president and general manager of **Pneuma-Serve Inc.,** Cleveland. For the last two years he was plant manager of Viking Air Conditioning Corp. **Neil B. Burdette** was made chief engineer and **Elmer J. Knitter** production manager.

A. W. Rose was made vice president and general manager, **Petro-Mechanics Research Division,** Borg-Warner Corp. He has offices at North Hollywood, Calif. Mr. Rose also is a vice president of Borg-Warner. He succeeds **Ernest L. Black,** resigned.

David H. Cissna was named director of sales, **Ingersoll Kalamazoo Division,** Kalamazoo, Mich., Borg-Warner Corp. He succeeds the late **H. William Overman.** Mr. Cissna formerly was vice president-general manager, Towmotor Sales & Service Inc.

R. L. Clark was elected president of **Strong Steam Specialty Mfg. Co.,** Conneaut, O., subsidiary of Strong, Carlisle & Hammond Co., Cleveland. **H. H. Maltbie** was made sales manager for the steam specialty division of S C & H and

LIMA, OHIO • Plants at Lima and Springfield, Ohio

T. W. HUNTER

ROBERT A. McCLURE

. . . general superintendents of U. S. Steel mills

will direct national marketing of Strong Steam specialties.

A. L. Billeter was made assistant to vice president-steel operations, **United States Steel Corp.,** Pittsburgh. His duties pertain to flat rolled product operations. **T. W. Hunter** succeeds Mr. Billeter as general superintendent of the Irvin Works, Dravosburg, Pa., and **A. T. Duff** was made assistant general superintendent. **Robert A. McClure** succeeds **John E. Angle** as general superintendent, Gary, Ind., sheet and tin mill, and **Robert B. Freeman** was made assistant general superintendent. Mr. Angle recently became vice president, industrial engineering.

Edwin C. McDonald succeeds the late **J. L. Miller** as assistant chief combustion engineer at **Republic Steel Corp.'s** Cleveland steel plant. **Frank A. Rowe** succeeds Mr. McDonald as superintendent, combustion engineering department.

Robert W. Matlock was named chief engineer, **Zenith Aircraft Division,** Zenith Plastics Co., Gardena, Calif.

Firewel Co. Inc., Buffalo, appointed **Albert D. DiMiccelli** purchasing agent and **John A. Grimm** production superintendent, research and development.

Edward N. Case joined **Ajax Electric Co. Inc.,** Philadelphia, as sales manager. He was manager, metal chemicals section, American Cyanamid Co.

Jack P. Tepley was made general sales manager, **Pacific Coast Engineering Co.,** Alameda, Calif. He succeeds **John F. Martin,** now associated with Paceco's Southern California representative.

Herbert A. Merrill was made chief inspector of quality control for **Portland Copper & Tank Works Inc.,** South Portland, Me.

Nebel Machine Tool Corp., Cincinnati, appointed **Warren G. Rosendahl** vice president and sales manager. He had former association with Lodge & Shipley Co., Clearing Machine Corp. and Hamilton-Thomas Corp.

Gar Wood Industries Inc., Wayne, Mich., appointed **Harold C. Clark** sales manager of its Findlay, O., Division. He was product sales manager for Load-Packer refuse collection bodies.

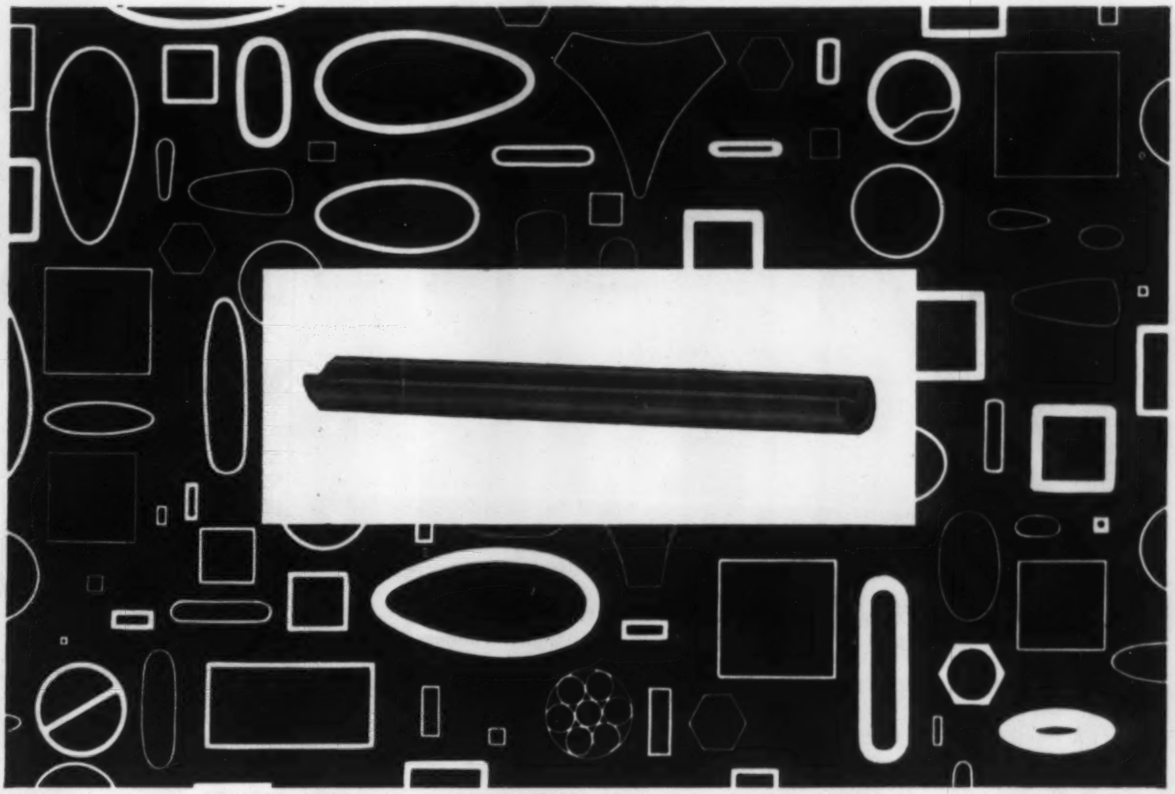
Chester M. Brown was elected president, **General Chemical Division,** Allied Chemical & Dye Corp., New York.

Hokin Aluminum Co. appointed **William P. Burke** general manager of its aluminum extrusion

EDWARD N. CASE
. . . Ajax Electric sales manager

WARREN G. ROSENDAHL
. . . Nebel Machine Tool v. p.

WILLIAM P. BURKE
. . . Hokin Aluminum plant manager



A few of the shapes available from SUPERIOR in standard specifications and tolerances or to your own design. The tube in the foreground is a gun drill shank made from 4130 alloy steel.

Save time and money on special shaped tubing

"SUPERIOR" TUBING IS IMMEDIATELY AVAILABLE IN A WIDE RANGE OF SHAPES, FORMS, ALLOYS

Turks-head rollers converting a round section of SUPERIOR tubing into the typical elliptical shape for a Bourdon gage tube.

Many manufacturers have discovered that SUPERIOR's ability to supply as standard what many firms consider specialty tubing saves them trouble, time and money. SUPERIOR makes round, square, oval, rectangular, elliptical and flat oval tubing, for instance. It makes capillary tubing, pointer tubing, electronic tubing, telescopic sizes, large OD-light wall tubing. Over 55 analyses are available in carbon, alloy and stainless steels; in nickel and nickel alloys; in beryllium copper, titanium, zirconium.

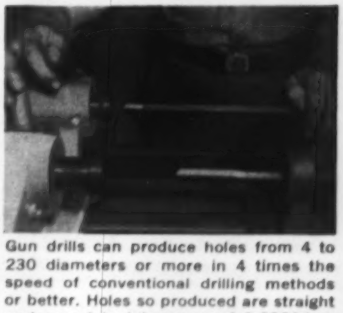
The gun drill shank shown above and on the right is a good example of SUPERIOR's ability to supply unusual shapes. This newly rediscovered method of producing close-tolerance high-finish holes demands straight, rigid, accurate shanks with a 110° V-groove. SUPERIOR can produce such a shape—and others—in a fraction of the time and cost it would take a customer to form his own.

If you're having difficulty getting the kind of tubing you want, SUPERIOR can undoubtedly help you. Write for your free copy of Bulletin 40—*A Guide to the Selection and Application of Superior Tubing.* SUPERIOR TUBE COMPANY, 2005 Germantown Ave., Norristown, Pa. *On the West Coast:* Pacific Tube Company, 5710 Smithway St., Los Angeles 22, Calif.

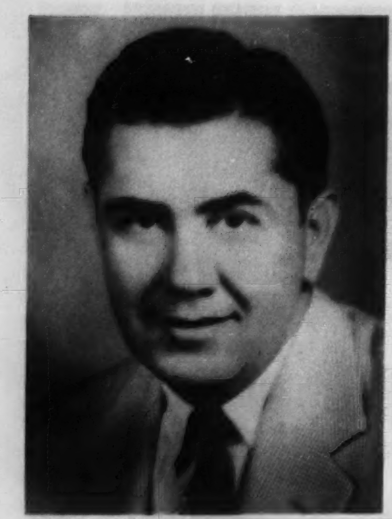
All analyses available in .010" to ⅝" OD; certain analyses in light walls up to 2½" OD

Superior Tube

The big name in small tubing



Gun drills can produce holes from 4 to 230 diameters or more in 4 times the speed of conventional drilling methods or better. Holes so produced are straight and round to tolerances of 0.0002" or less and wall finishes are 7 mu-in or better.



JASPER F. BURT
. . . La Porte Aircraft plant mgr.

J. W. KINNEAR JR.
. . . TC&I vice president-operations

DONALD K. SMITH
. . . Republic's steel and tubes sales post

plant in Dolton, Ill. He was formerly with Inland Steel Co.

Jasper F. Burt was made plant manager for Whirlpool - Seeger Corp., **La Porte Aircraft Division**, La Porte, Ind. He succeeds **Roy L. Erickson**, now general auditor for the corporation.

Basic Refractories Inc., Cleveland, integrated its Ohio plants under a single management. To co-ordinate these activities, **A. M. Caito** was made manager of Ohio operations. **E. P. Pearson** was made assistant technical director. His former position as director of research in charge of the Bettsville, O., laboratories was assigned to **Vaughn V. Hughey. Neil F. Meredith** was made production manager at the Maple Grove, O., Works.

National Engineering Co., Chicago, appointed **James L. Yates** midwest district manager.

J. W. Kinnear Jr. was appointed vice president-operations, **Tennessee Coal & Iron Division**, U. S. Steel Corp., Birmingham. He succeeds **J. M. Spearman**, now assistant to the division president. Mr. Kinnear was assistant vice president-engineering for the corporation at Pittsburgh and is succeeded by **E. L. Tindall. P. E. Thomas** was named to succeed Mr. Tindall as chief engineer-steel.

McKinney Mfg. Co., Pittsburgh, appointed **Glenn K. Rosenfelder** manager of its central sales region, Chicago. He succeeds **Thomas J. Kalahar.**

David W. Thomas joined **Solar Steel Corp.**, Cleveland, in an administrative capacity. **Leo F. Hagerty** was made assistant to the president in the Detroit area.

C. Edward Ball was made marketing manager of **Hill-Chase Steel Co. of Maryland**, Baltimore.

Donald K. Smith and **Paul G. Miller** were promoted to sales positions with the steel and tubes division of **Republic Steel Corp.**, Cleveland. Mr. Smith is sales manager, mechanical division, succeeding **J. J. I. Jamieson**, now assistant general manager, steel and tubes sales. Mr. Miller succeeds Mr. Smith as central district sales manager.

Edward P. Geary was elected president of **Vanadium-Alloys Steel Canada Ltd.**, London, Ont. to succeed **Gordon Barker**, now vice chairman of the board. Mr. Geary formerly was executive vice president of Atlas Steels Ltd.

Dr. Ronald C. Vickery joined the chemistry and metallurgy research staff of **Horizons Inc.**, Cleveland.

Earl F. Lowe Jr. succeeds the late **Maurice Webb** as general superintendent of **Interlake Iron Corp.'s** Duluth plant.

OBITUARIES . . .

Harry S. Blumenthal, 72, cofounder of **Suisman & Blumenthal**, Hartford, Conn., scrap metal firm, died Oct. 28.

Edison L. Wheeler, 68, president, **Wheeler Protective Apparel Inc.**, Chicago, died Oct. 31.

William W. Brown, 71, former manager, bar sales and coke oven products, **Youngstown Sheet & Tube Co.**, died in West Palm Beach, Fla., Oct. 22.

John H. Schuler, 60, sales manager, **Albany Casting Co.**, Auriesville, N. Y., died Oct. 30.

Earl C. Petrie, 52, director of research for **North American Refractories Co.**, Cleveland, died Nov. 2.

Frank C. Wheeler, 63, owner of **Kinman & Wheeler Laboratories**, Syracuse, N. Y., died Oct. 25.

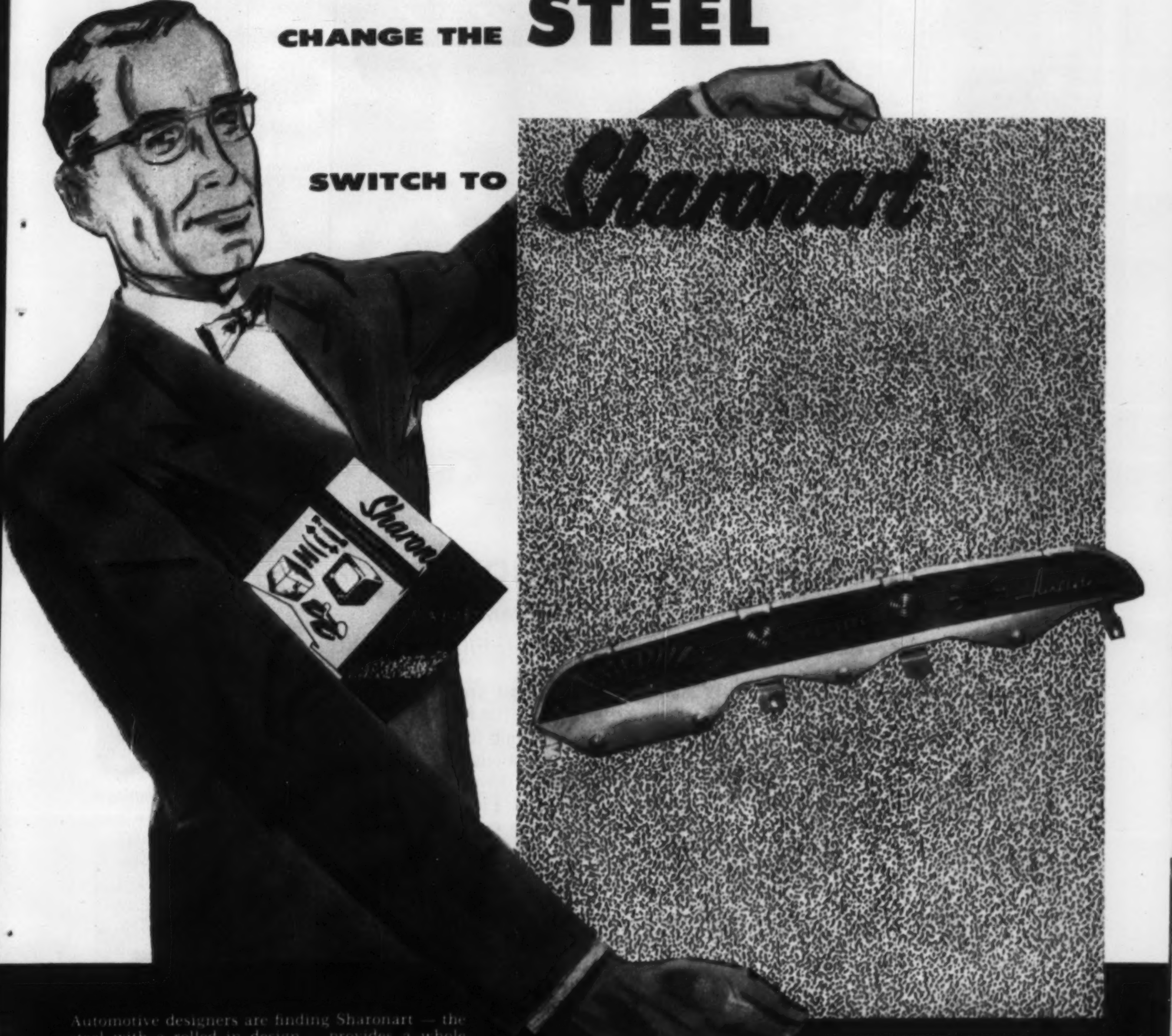
G. B. Barlow, 60, plant controller, El Segundo, Calif., division, **Douglas Aircraft Co.**, died Oct. 20.

Raymond E. Meredith, 45, superintendent of plant protection at **Republic Steel Corp.'s** Cleveland steel plant, died Oct. 31.

TO CHANGE THE *Style*

CHANGE THE **STEEL**

SWITCH TO



Automotive designers are finding Sharonart — the steel with a rolled in design — provides a whole new field of design possibilities. It permits restyling without expensive die change. It provides the widest possible flexibility in working out new models. It is unusually adaptable to two-tone spray painting. It adds a richness to your product, and, because it doesn't mark or show scratches, it brings extra utility to those parts that must withstand abuse.

If you are not already familiar with the many advantages of designing with Sharonart you will want a copy of the new bulletin that thoroughly explains this remarkable steel. It's free for the asking. Contact the Sharon representative in your area or write direct

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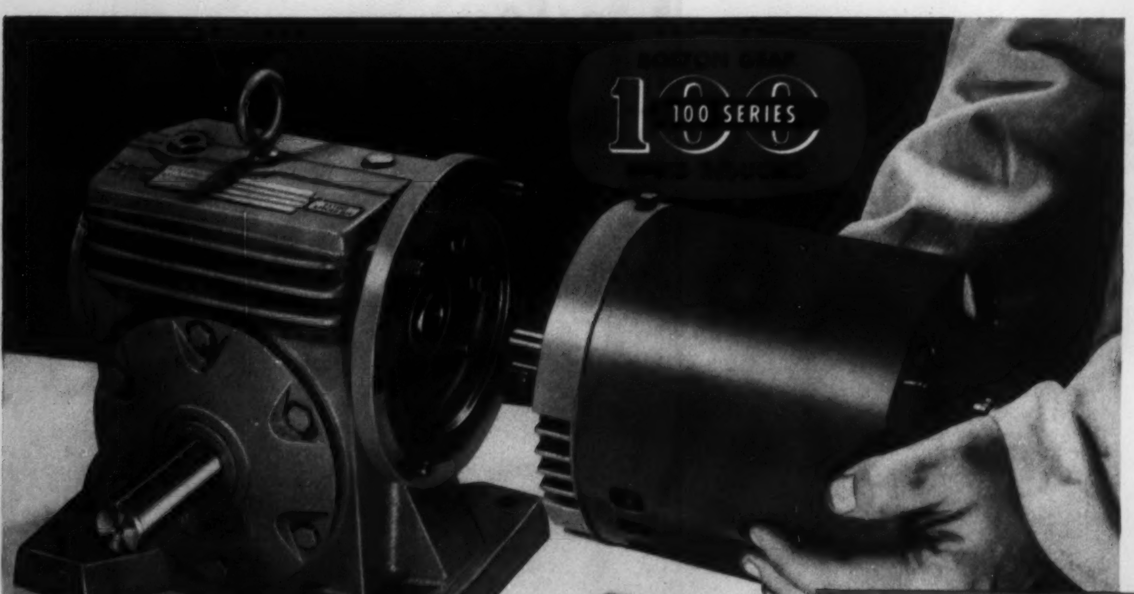


RATIOMOTORS
The complete power package, with motor.

SOLD WITH OR WITHOUT MOTOR

FLANGED REDUCTORS
The Ratiomotor gear unit, supplied without motor. You buy and attach any motor you choose.

New COST-SAVING "COMBINATION"

for certified efficiency—easy maintenance —and unlimited adaptability

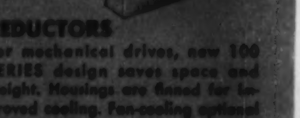
THE NEW 100 SERIES RATIOMOTOR combines a gear reduction unit and an easily detachable, standard end-mounted motor.

MOTOR CAN BE REMOVED and replaced in a few minutes, without disturbing the gear reduction unit. Saves maintenance time, preserves alignment, permits continued operation with spare motor.

ORIGINAL MOTOR CAN BE CHANGED When conditions require change to a motor of special characteristics (totally enclosed, explosion-proof, etc.) it can easily be attached in place of the original motor.

ANY MODEL NEEDED — FROM STOCK The 100 SERIES includes 1064 different *standardized stock* units for an unlimited range of applications . . . Reductors, for mechanical drives, as well as Ratiomotors and Flanged Reductors. All ratings are *certified* to be actual torque delivered, by Independent Laboratory tests.

A BOSTON GEAR FIELD ENGINEER will help you simplify planning, and put your product ahead in design. Your Boston Gear Distributor will arrange a call, or write: Boston Gear Works, 73 Hayward St., Quincy 71, Mass.



REDUCTORS
For mechanical drives, new 100 SERIES design saves space and weight. Housings are finned for improved cooling. Fan-cooling optional on larger sizes.

MAXIMUM HORSEPOWER PER DOLLAR
Certified
by Independent Laboratory tests

PATENTS PENDING

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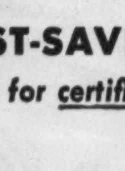
Lists models for any drive . . . horizontal or vertical—right angle or parallel—single or double reduction. Includes selection charts, engineering data.



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108 MODELS — FROM STOCK

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For nearest distributor, look under "GEARS" in the Yellow Section of your Telephone Directory.

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Screw Firms Merge

Cleveland Cap Screw and Standard Pressed Steel unite technical and metallurgical resources

CLEVELAND CAP Screw Co. and Standard Pressed Steel Co. are merging into one of the largest organizations in the metal fastener industry. Both companies will retain their present names and will continue their management, personnel and sales policies.

The consolidated organization will have a net worth of more than $20 million and annual sales exceeding $40 million. The two firms have some 2 million sq ft of floor space in plants in this country and England.

Complete Line—Product lines of the two companies complement each other. Cleveland Cap Screw developed the double-extrusion process for making hexagon head steel cap screws. The firm is completing a plant with 400,000 sq ft of floor space at a cost of more than $4.5 million on Lee road, Cleveland. Its old plant is at 2917 E. 79th St., that city.

Standard Pressed Steel produces a wide variety of precision, high-tensile aircraft fasteners, all-metal locknuts, socket-head screw products, nonferrous and high-temperature screws, screw machine products and a complete line of shop equipment, including work benches, tool stands and shelving.

SPS has two large plants in Jenkintown, Pa., and completed a $10 million expansion of the main plant there last year. The company has the following wholly owned affiliates: Unbrako Socket Screw Co. Ltd., Coventry, England; Sheffield Steel Works, near Sheffield, England; Cooper Precision Products, Los Angeles; Standco Canada Ltd., Toronto, Canada.

SPS announced earlier this year development of the first successful titanium bolt for critical aircraft tension applications.

Kaiser Opens Branch Offices

Kaiser Aluminum & Chemical Corp., Oakland, Calif., established branch sales offices at 615 W. Genessee St., Syracuse, N. Y., under the managership of D. R. Tietjen; at 360 Delaware Ave., Buffalo, under the managership of John R. Nemes; and at 112 Tryon St., Charlotte, N. C., under the managership of H. B. Lockwood.

Got a Stainless, Bud?

THEY'RE making nickels and dimes out of stainless steel down in Costa Rica these days.

Costa Rican officials say it looks like stainless is going to stay. The metal "preserves its brilliant color, does not tarnish and is highly resistant to the wear and tear that usually damages other metals."

The country recently placed a large order for coins of one and two "colones" (1 colone is worth about 18 cents at the current rate of exchange).

California Spring Co. Expands

California Spring Co. Inc., manufacturer of mechanical coil springs, wire forms, metal stampings and small assemblies, is constructing a 70,000-sq-ft, $1.5-million plant at 8405 E. Slauson Ave., Los Angeles, to triple production capacity.

Boice Mfg. Triples Facilities

Boice Mfg. Co., Staatsburg, N. Y., producer of precision dial gages and setmasters, has launched an expansion program which will more than triple its existing facilities. A plant will be constructed at Hyde Park, N. Y.

Heat Treating Firms Merge

Allied Metal Treating Corp., Milwaukee, acquired Wesley Heat Treating Co., Manitowoc, Wis.; Wesley Metal Treating Co., Spindler Metal Processing Co., and Capitol Heat Treating Co. Inc., Racine, Wis. Officers of the enlarged corporation are: C. I. Wesley, president; Mrs. Ann F. Wesley, vice president; H. R. Wesley, sec-

(*Please turn to page 92*)

Don't junk your old planer just because it rumbles along like a freight train. Now is the time to have your outdated machine tools returned to their original performance levels through Simmons Engineered Rebuilding—at half the cost of new equipment.

Engineered Rebuilding by Simmons *unconditionally guarantees* that your machine tools will equal or exceed manufacturers' original specifications.

And, through modernization, Simmons is adapting old machines to high-speed, high-precision production that was unheard of when the tools were new.

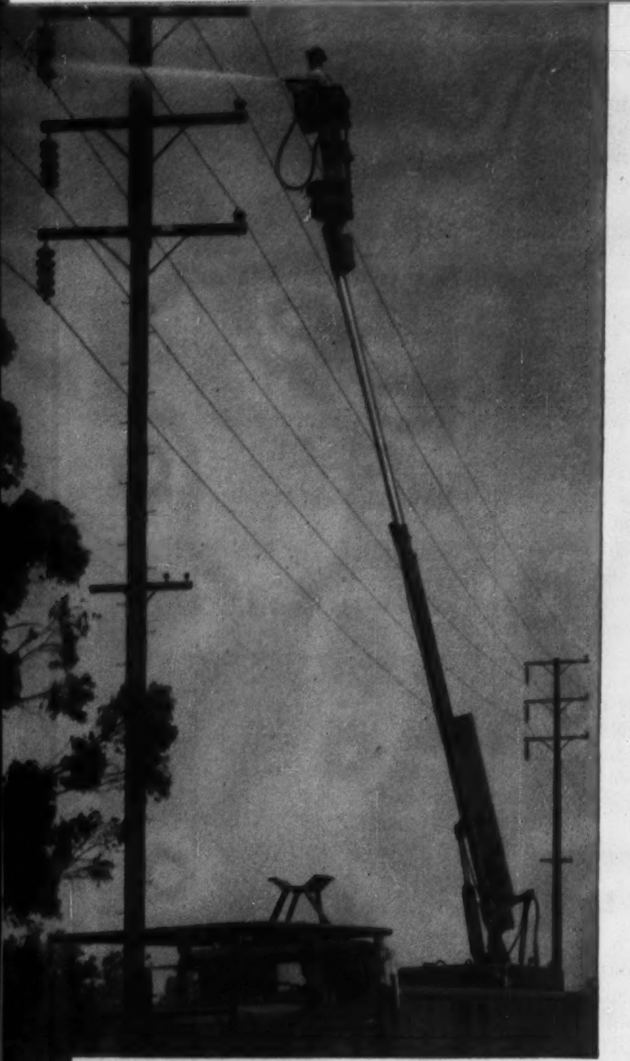
Today: look into the important economies in production, maintenance, and liberal tax allowances available when you turn the old machines in your plant into precision equipment for today's production!

Write, wire, or phone...

Simmons Machine Tool Corp.
1755 N. Broadway, Albany 1, N. Y.

Unconditional guarantee...
our standard since 1910

BACKBONE OF A NATIONAL



THE HYDRAULICALLY-OPERATED TELESCOPING BOOM of this "Industrial Monkey" is comprised of two sections of USS Shelby Seamless Mechanical Tubing—an inner member and an outer member. These "Monkeys" have many uses, including tree trimming, line work, street light servicing, painting, building maintenance and fire fighting.

THE NATIONAL SEAMLESS METHOD of manufacture is one of the most difficult forging operations in the steel industry. A billet of the finest steel is actually pierced to produce a seamless tube with absolutely uniform wall strength. No welds . . . no joints . . . no weaknesses.

SEAMLESS STEEL BOTTLES, 39 feet, 3 inches in length and 24 inches in diameter, hold gas at 2,240 p.s.i. for underground gas storage. Before leaving the factory, each bottle is subjected to a severe high pressure hydrostatic test which insures the user the maximum in safety, top performance and long-time service.

DEEP WELL DRILLING demands the utmost in strength of tubular materials. National Seamless is chosen consistently because of its ability to resist fatigue, twisting action and collapse. A complete line of National Seamless Drill Pipe, Casing and Tubing is available to meet the needs of the Oil Industry.

HUNDRED INDUSTRIES...

Seamless Pipe and Tubes

From power plants to cross-country pipelines – in any application where high strength, complete dependability and long life are mandatory—you're sure to find USS NATIONAL Seamless Pipe and Tubes.

NATIONAL Seamless combines to the highest degree the desirable qualities of strength, safety and workability. Uniform throughout and dimensionally accurate, NATIONAL Seamless Pipe and Tubes machine cleanly, weld readily, and promise smooth installation and long satisfactory service. They are available in a complete range of steel analyses, wall thicknesses and diameters. And every foot of NATIONAL Seamless is produced to exacting standards by the world's largest manufacturer of tubular steel products.

Bring your pipe and tubing problems to National Tube. Regardless of the application, our engineers are interested in discussing the problem with you.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

SEE The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station

USS

National Seamless Pipe and Tubes

WALLS WITHOUT WELDS

UNITED STATES STEEL

ABOUT 34,000 TONS of 12¾" O.D. National Seamless Steel Pipe were used in this 475-mile oil products pipeline, from Duncan, Oklahoma to West Memphis, Arkansas. Its ability to resist great pressures and absorb distorting and bending stresses makes National Seamless ideal for pipelines.

49 MILES OF NATIONAL SEAMLESS TUBES make up this giant superheater. At thousand-degree temperatures, high-pressure steam lines *must* have the strength and uniformity to take constant punishment without failing. National Seamless has never been surpassed for safe, efficient power plant service.

A direct line
to your stockpile
of . . . . .

52100
STEEL TUBING and BARS*

TUBES

BARS

WIRE

FORGINGS

Phone or write for the latest stock list . . .
Contains complete information on sizes, finishes, analyses, etc.

*Leaded and Non-Leaded

55-2

PETERSON STEELS, INC.
UNION, NEW JERSEY
Detroit, Michigan • Chicago, Illinois

(*Concluded from page* 89)

retary; and J. F. Hushek, treasurer.

Donnelly Mfg. Leases Space

Donnelly Mfg. Co., fabricator of light metal products for electronics, will occupy 60,000 sq ft of space in a $300,000 plant being built at Waltham, Mass., by Cabot, Cabot & Forbes, Boston.

Sells Dust Tester Rights

Trion Inc., McKees Rocks, Pa., maker of electronic air cleaners, has sold all rights to its Dill dust-spot tester to Research Appliance Co., that city.

Enlarges Freight Car Plant

Pullman-Standard Car Mfg. Co., Chicago, is undertaking the first phase of a multimillion-dollar expansion and improvement program at its Bessemer, Ala., freight car plant. The first phase will add 100,000 sq ft of buildings to existing facilities at a cost of more than $1 million. Annual production will be increased from 1500 to 2000 freight cars.

Electronics Firms Merge

Litton Industries, Beverly Hills, Calif., maker of electronics, acquired Automatic Seriograph Corp., College Park, Md., producer of specialized electronic equipment.

Dravo Offers Lubricant Line

Dravo Corp., Pittsburgh, bought the mill lubricant department of DeLaval Separator Co., Poughkeepsie, N. Y., and will make it part of its Machinery Division. Dravo's new lubricant section will offer design engineering and installation service to the steel, nonferrous and other industries requiring specialized lubrication systems.

The company also started a $400,000 building program in Pittsburgh for centralized research operations. Three main laboratories will be set up: A physical testing laboratory for concrete and fabricated steel products; a facility for testing and developing machinery used in sintering and pelletizing iron ore fines and other

Quickest Way to Get a Refusal

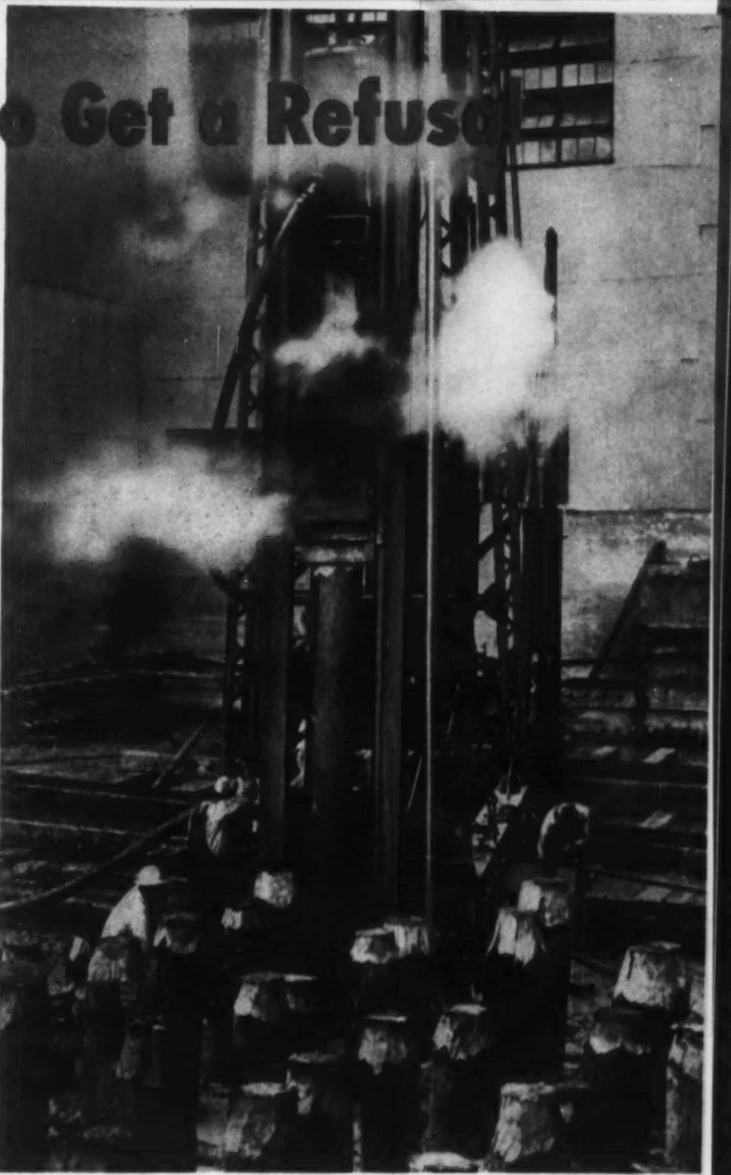


PHOTO COURTESY JAEGER MACHINE COMPANY, COLUMBUS, OHIO

Chrysler-powered jetting pumps help sink 1250 ninety-foot piles into hard-packed sand, averaging 25 per day

Job: foundation for addition to large electric power plant. Objective: bring 1250 ninety-foot timber piles to bear on hard pan underlying tight-packed sand formation. Problem: impossible to drive piles into hard sand with hammer. Solution and method of operation: two Chrysler Ind. 32-powered high-pressure Jaeger jetting pumps operating in parallel or in series as necessity required.

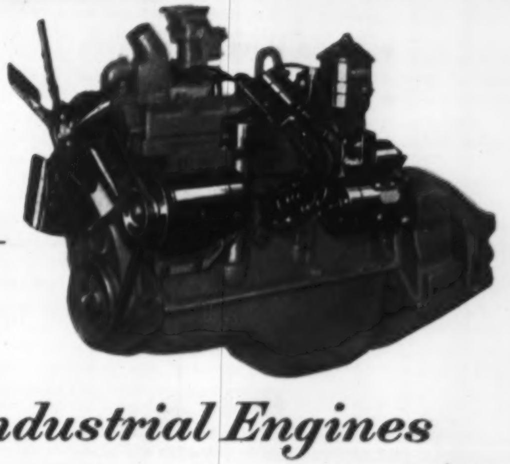
It wasn't that simple, however. Hard-packed sand is never easy to penetrate. Operating in parallel the two pumps discharged 950 gallons per minute at 200 pounds per square inch pressure to blast holes more than eighty feet deep into which the piles sank with only the weight of the hammer. Six to nine minutes of driving with hammer then brought the piles to refusal at hard pan. When greater pressure was needed, the pumps were set to operate in series delivering 475 gallons per minute at 400 pounds per square inch. At many points sand formation was so tight the jet stream would work like a hydraulic piston and send pipe and all shooting out of the ground. To counteract this, extra-heavy pipe weighing over 2800 pounds was used.

Despite difficulties the jetting operation was handled with unusual speed. On the average it took about fifteen minutes to drive a pile to refusal. As many as 33 piles were put down in a single eight-hour day. The two Jaeger Model 5 CPH Pumps and Chrysler Ind. 32—265 cubic inch displacement engines required nothing beyond regular maintenance care.

Assure your users record-breaking performance with top operating economy. Power with *proven-dependable* Chrysler Industrial Engines—230 to 413 cubic inch displacement. A long list of optional equipment enables Chrysler to supply engines to meet end product requirements.

Chrysler Industrial Engines are not expensive. Production-line methods adapted to specialized industrial engine building provide custom-built engines at mass-production prices. See a Chrysler Industrial Engine Dealer, or write:

Dept. 811, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.



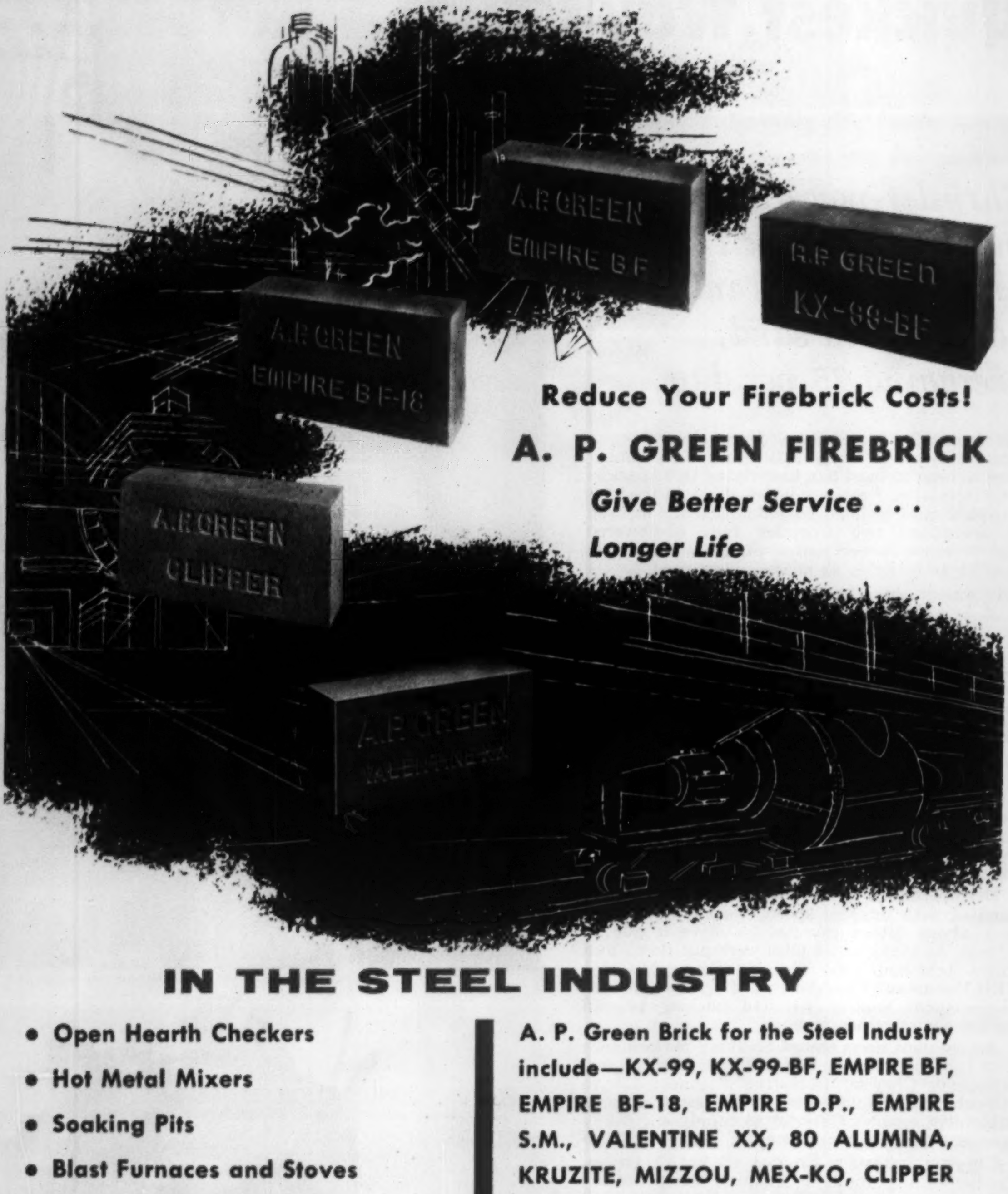
CHRYSLER IND. 32 ENGINE—
265 CUBIC INCH
DISPLACEMENT

CHRYSLER ***Industrial Engines***

INDUSTRIAL ENGINE DIVISION • CHRYSLER CORPORATION

HORSEPOWER WITH A PEDIGREE

AGRICULTURE • INDUSTRY • CONSTRUCTION • OIL FIELDS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EMPIRE B F
A.P. GREEN
KX-99-BF
A.P. GREEN
EMPIRE B F-18
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CLIPPER
A.P. GREEN

Reduce Your Firebrick Costs!

A. P. GREEN FIREBRICK

Give Better Service . . .

Longer Life

IN THE STEEL INDUSTRY

- **Open Hearth Checkers**
- **Hot Metal Mixers**
- **Soaking Pits**
- **Blast Furnaces and Stoves**
- **Hot Metal Transfer Cars**
- **Slab Heating and Other Types of Steel Plant Furnaces**

A. P. Green Brick for the Steel Industry include—KX-99, KX-99-BF, EMPIRE BF, EMPIRE BF-18, EMPIRE D.P., EMPIRE S.M., VALENTINE XX, 80 ALUMINA, KRUZITE, MIZZOU, MEX-KO, CLIPPER D.P., CLIPPER S.M., and TEXAMO.

Other Products—a complete line of Castables, Mortars, and Plastics.

A P Green
REFRACTORY
PRODUCTS

A. P. GREEN FIRE BRICK COMPANY
MEXICO, MISSOURI, U. S. A.

PLANTS: Mexico, Mo. • Woodbridge, N. J. • Sulphur Springs, Texas
In Canada: A. P. Green Fire Brick Company, Ltd., Toronto 15, Ontario

bulk raw materials; and one for research on heating and air conditioning equipment.

Pennsalt Opens District Office

Cincinnati has been selected as headquarters of a new district sales territory for the metal processing department of Pennsylvania Salt Mfg. Co., Philadelphia. Operations will be directed by Bill Wilson, district sales manager.

Western Gear Changes Name

Western Gear Works, Lynwood, Calif., changed its name to Western Gear Corp. The firm makes mechanical power transmission equipment and special machinery.

ANNIVERSARIES

Warner & Swasey Co., Cleveland, is celebrating its 75th anniversary. The company builds turret lathes, single and multiple-spindle automatics, tappers, textile machines and Gradall earthmoving machines. It has built the mechanisms for some of the world's most famous telescopes.

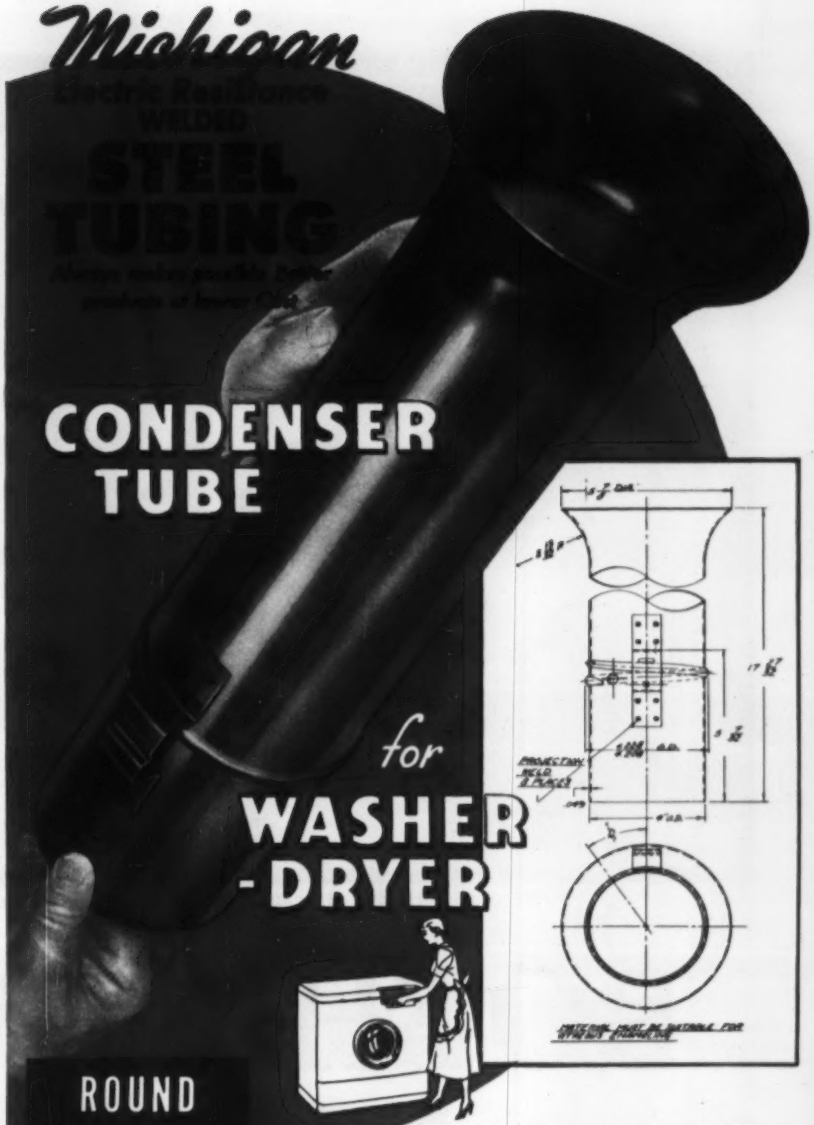
ASSOCIATIONS

R. H. Ferguson, assistant director of industrial relations, Republic Steel Corp., was elected vice chairman of the **Industrial Conference** of the **National Safety Council**, Chicago.

V. S. Lazzara, president, Casting Engineers Inc., Chicago, was elected president of the **Investment Casting Institute**. R. S. Banister of Midwest Foundry Co., Coldwater, Mich., was elected vice president.

C. H. Ker, president, Dalton Foundries Inc., Warsaw, Ind., was re-elected president of the **Gray Iron Founders' Society Inc.**, Cleveland. Other officers are: J. Scott Parrish Jr., Richmond Foundry & Mfg. Co. Inc., Richmond, Va., vice president; C. H. Meminger, Posey Iron Works Inc., Lancaster, Pa., secretary; W. O.

(*Please turn to page 98*)



ROUND

¼ to 4 O.D. 7 to 22 gauge

SQUARE	Gauge	RECTANGULAR
¼ to ½	16 thru 22	
½ to 1	11 thru 22	⅝ minimum
1 to 2	11 thru 20	side to 5
2 to 3	11 thru 18	maximum side

Carbon 1010 to 1025

Michigan Tubing

has uniform strength, weight, ductility, I.D. and O.D., wall thickness, machinability, and weldability. It can be flanged, expanded, tapered, swaged, beaded, upset, flattened, forged, spun closed, fluted, and rolled. Available in a wide range of sizes, shapes and wall thicknesses, prefabricated by Michigan or formed and machined in your own plant.

minant component of a new combination washer-dryer now on the market is this condenser tube fabricated by Michigan.

In the manufacture of this important tubular part, which helped make possible a major forward step in the development of an appliance for better living, Michigan engineers were required to solve a difficult production problem. The utmost design skill and fabrication accuracy were essential.

Refer to the drawing and note the expansion required for this part and the spiral bead—operations commonly and efficiently performed with Michigan's modern fabricating equipment. The bracket is projection welded to the tube in a single high production operation—another typical example why Michigan engineers and production workers cannot be excelled in the quantity manufacture of intricate tubular products at low cost.

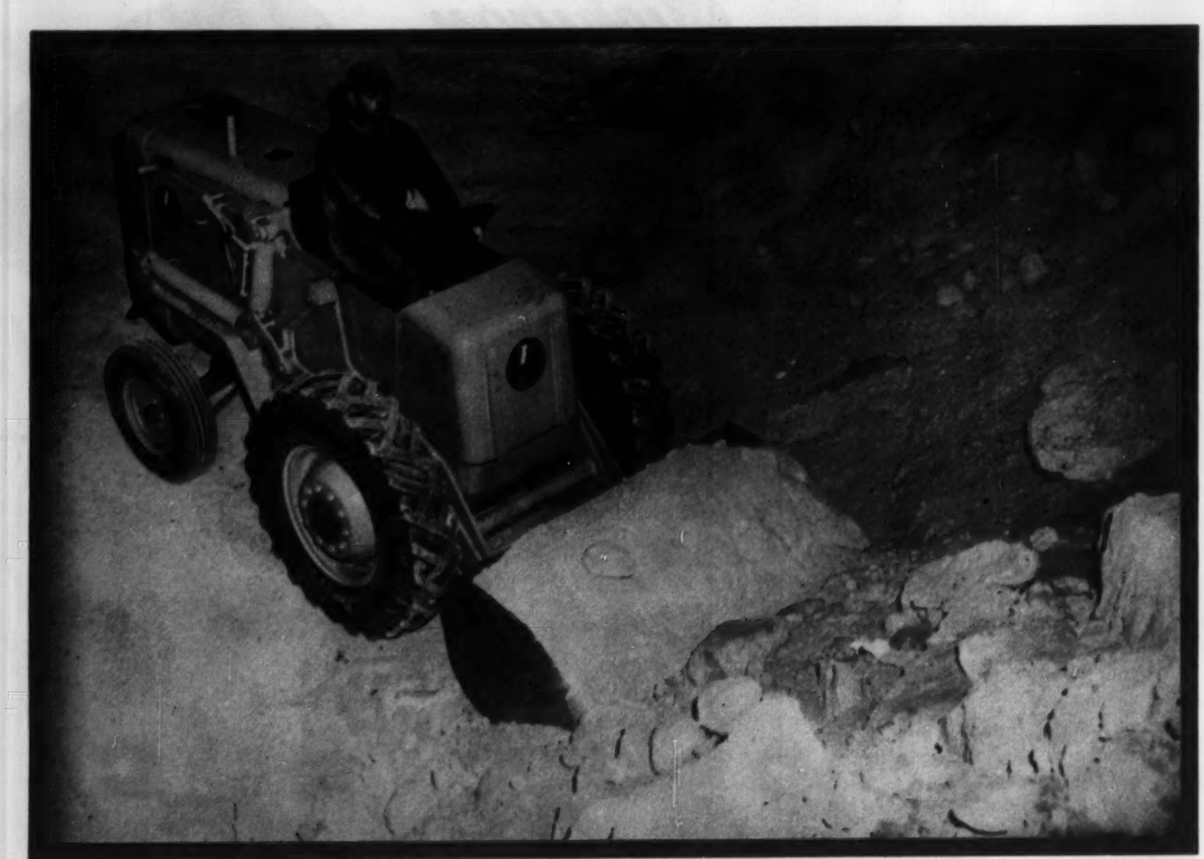
Always consult Michigan first on any special tubular job requiring the greatest accuracy of product and economy of manufacture.

Michigan STEEL TUBE PRODUCTS CO.

THE OLDEST NAME IN ELECTRIC RESISTANCE WELDED STEEL TUBING

Nearly 40 Years in the Business
9450 BUFFALO ST. • DETROIT 12, MICH.
FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—Service Steel Div., Van Pelt Corp., Los Angeles, Calif.—Donald A. Harston, Cleveland, Ohio—Globe Supply Co., Denver, Colo.—W. A. McMichaels Co., Upper Darby, Pa.—A. J. Fitzgibbons Co., Buffalo, N. Y.—William P. Hall & Associates, Dayton, Ohio



New **model HAH** — digs and carries up to 1 cu. yd. or 3,000 lbs. at a time.

BOTH NEW and

DIGGING POWER

3,000 lbs. and 4,500 lbs. of tractive thrust, plus powerful upward rotation of bucket by twin hydraulic rams, develop tremendous digging power.

40° BUCKET TIP-BACK

Bucket tips back 40° on its hinges before it is even lifted — to get heaped bucket-loads quickly and prevent loss due to spillage.

CARRYING CAPACITY

40° tip-back also brings loaded bucket back close to machine *and low* for safe, fast transport.

SAFETY-STABILITY

Bucket arms and other moving parts are mounted and positioned low where they are no hazard to operator's limbs.

New **model HA** — digs and carries up to 18 cu. ft. or 2,000 lbs. at a time.

More Productive

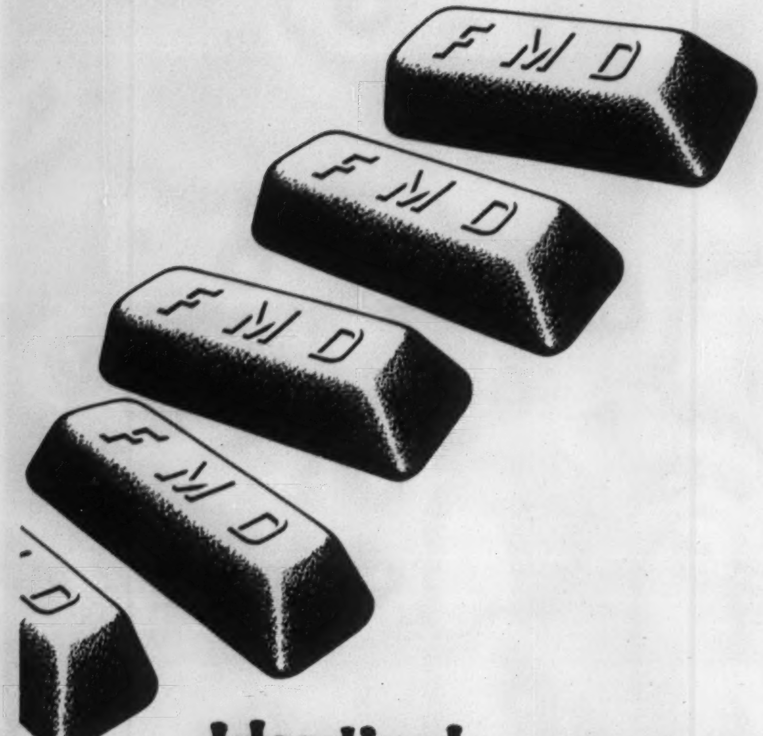
Hough, the pioneer and leader in the tractor-shovel industry, is pleased to present these all-new "PAYLOADER" units. Both have front-wheel-drive and rear-wheel-steer — especially designed for stockpile work and fast material moving in close quarters. They give you a choice of sizes to best fit your requirements — they're the finest of their type in Hough history — they're both way ahead of the field in design, performance and all-round value.

Your Hough Distributor is eager to show what these new machines can do for you. The Frank G. Hough Co., 876 Sunnyside Ave., Libertyville, Ill.

OTHER FEATURES of these outstanding new models include: torque converter drive; full-reversing transmissions; closed, pressure-controlled hydraulic system; large hydraulic brakes; accumulator in hydraulic system that prevents pressure shocks and facilitates bucket control.

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
876 Sunnyside Ave., Libertyville, Ill.
Send data on "PAYLOADER" units
Model HA ☐ Model HAH ☐ larger sizes ☐
Name..
Title..
Firm..
Street..
City.................. State..................



Identical brass ingots now . . . or a year from now

Your order for specification brass today and your order for the same brass a year from now will be identical. Every heat of brass that Federated pours is carefully and repeatedly analyzed. Quality control at Federated is not just an occasional check, but is a regular step in every phase of our production program.

If your castings are hard to pour, or if they are designed for difficult, specialized service, this quality control is important to your customers. They must know that every order you fill will be identical so that they can buy from you with complete confidence.

Federated has a foundry service organization that can help you with any casting problems. Experts who know the cause of casting failures are available to visit your foundry and make corrective suggestions. And backing up these experienced servicemen is a complete, modern, non-ferrous metals laboratory that can trace the cause of trouble right back to its source.

Take advantage of these Federated extras. So many foundries do that we are known as Headquarters for Non-Ferrous Foundry Metals and for technical information on foundry problems. We have 13 plants and 23 sales offices across the country. Any of them will be pleased to help you.

Federated Metals
DIVISION OF AMERICAN SMELTING AND REFINING COMPANY
120 BROADWAY, NEW YORK 5, N. Y.
In Canada: Federated Metals Canada, Ltd., Toronto and Montreal

Aluminum, Anodes, Babbitts, Brass, Bronze, Die Casting Metals, Lead and Lead Products, Magnesium, Solders, Type Metals, Zinc Dust

(Concluded from page 95)

Larson, W. O. Larson Foundry Co., Grafton, O., treasurer.

Porcelain Enamel Institute, Washington, elected these officers: President, Glenn A. Hutt, Ferro Corp., Cleveland; vice presidents, J. E. Bourland, Texlite Inc., Dallas; J. L. Hodgkinson, U. S. Porcelain Enamel Co., Los Angeles; R. C. Myers, U. S. Steel Corp., Pittsburgh; H. McE. Patton, Ingram-Richardson Mfg. Co., Beaver Falls, Pa.; R. N. Smith, Temco Inc., Nashville, Tenn.; Yost C. Smith, AllianceWare Inc., Alliance, O.; Herbert Turk, Pemco Corp., Baltimore; J. W. Vicary, Ervite Corp., Erie, Pa.; John Winget, Armco Steel Corp., Middletown, O. P. B. McBride, Porcelain Metals Corp., Louisville, was re-elected treasurer. John C. Oliver was elected managing director of the institute and re-elected secretary.

REPRESENTATIVES

Thomas Truck & Caster Co., Keokuk, Iowa, manufacturer of manual materials handling equipment, appointed these representatives: John R. Davis, Detroit metropolitan area; J. L. Neale Co., Scranton industrial area; J. J. McArdle Co., Connecticut; Pacific Northwest Agents Inc., Seattle-Portland trading areas; Warehouse Equipment & Supply Co., San Francisco area; and Colson-Merriam Co., Washington.

Pace Corp., Base Line, Mich., producer of precision machined parts, stampings, assemblies and impact steel extrusions, appointed Morgan Buford as its representative in southern Ohio and northern Kentucky.

NEW ADDRESSES

National Barrel & Drum Association Inc. moved to the Associations Bldg., 1145 19th St. N.W., Washington 6, D. C.

Cerro de Pasco Corp. moved its offices to 300 Park Ave., New York 22, N. Y.

HEAVY-DUTY
AND
HIGH SPEED
in producing
NON-FERROUS ROD

Vaughn
TANDEM MACHINES

Vaughn Tandem Machines have power, speed and stamina to handle with ease your heaviest products in non-ferrous metals. Vaughn experience in design and manufacture is your guarantee of continuous operating satisfaction and long service life. Let us discuss your requirements!

"Quick on the Draw!"

The VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

Room Service

. . . for companies that are growing fast

Friends of ours in the machine tool business recently needed more manufacturing room to keep important customers happy. Expanding sales had absorbed production facilities needed to make their standard line of hob sharpeners. Something had to be done fast.

So they came to Taft-Peirce. We took over the complete production of the hob sharpeners — from base castings to finished product. Machining, heat-treating, assembling, inspection and testing. Then shipped over two hundred of these machines direct to the final customer. Orders were filled, customer good will maintained, and not one cent spent for temporary facilities.

Perhaps you can use a swift, complete, creative manufacturing service like this. Learn more about it simply by sending for our booklet, "Take It To Taft-Peirce".

For Engineering, Tooling, Contract Manufacturing

TAKE IT TO TAFT-PEIRCE

The Taft-Peirce Manufacturing Company, Woonsocket, R.I.

TELEPHONE: WOONSOCKET 1

10

STEEL's 1955 Management Series . . .

The editors of STEEL herewith present the tenth in their ten-part series, Program for Management for 1955. The complete list:

1. **Product Communication** (Feb. 14, p. 73)
2. **Cut Costs To Preserve Profits** (Mar. 14, p. 93)
3. **Better Plant Layout** (Apr. 18, p. 93)
4. **Business Communication** (May 16, p. 103)
5. **When To Re-Equip** (June 20, p. 99)
6. **Put Business Trends To Work** (July 18, p. 93)
7. **Business Consultants** (Aug. 15, p. 123)
8. **Value Analysis** (Sept. 19, p. 101)
9. **Market Facts** (Oct. 24, p. 91)
10. **Keep Your Product Growing** (Nov. 14, p. 101)

• *Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*

Keep Your Product Growing

"WHEN Le Tourneau came along with a carry-all, pickup earthmoving device some years ago, we were caught with our technological pants down," recalls an official of a competing company. "Only now, after placing greater emphasis on product research and development, are we regaining our former sales position."

What assurance do you have that tomorrow — even today — a competing product or process won't put you on the spot? You don't. But chances are good you won't be caught if you have an active product research and development program.

Better still! Chances are good that *you'll* be the one to come up with a new improvement, process or product which will give *you* the jump on the competition.

Think back just ten years. How many of your products or the processes you're using to produce them haven't been changed or improved three or four times? How many products in your own industry were not being made ten years ago?

"The danger of technological obsolescence in products and processes is always present," says M. R. Nestor, project development manager at Battelle Memorial Institute, Columbus, O. "The key to keeping pace with technological change is to diagnose the problem before serious trouble occurs. It's like a medical check up: Spot the danger signs and take action. Don't wait until the product is ailing; it may be too late."

Watch Those Symptoms

There are many warnings (see checklist, p. 102) to signal when your product may be headed for trouble: "ABC will be back as soon as they find out those castings won't work as well as our forgings." "Salesman Jones is a good man; he'll get that contract back next year." "They're taking a loss on the item; they can't make it that cheaply."

That kind of thinking is behind many of the business failures today—and 1955 is a banner business year.

Suppose that you spot one or

Your Product Is Not Growing and—Research and Development Is Needed When . . .

1. Competing products made of other materials begin to make inroads into your sales
2. Your sales are stable or declining while your competitors' are rising rapidly
3. Technological or market changes point to eventual elimination of the end product using your component
4. Your sales force reports increasing complaints about quality
5. You encounter increasing evidence that you are being underpriced by most of the competition
6. Competition brings out a new product improvement or related new product

more of these danger signals, or you want a check up just in case. What do you do? Where do you start?

The logical reply, and most experts agree it's the best first step: A market study. But don't stop there; too many companies do. It gives them only one leg to run with to find a solution. The second leg: A technical study—product research and development.

World War II demonstrated the effectiveness of research and development as an industrial tool in an emergency. When the government began to cut appropriations after the war, industry didn't drop the ball but increased its own outlays. In 1948, after the government expenditures again took an upturn, research activity hit the $2-billion mark (see p. 103); this year the figure will come close to $4 billion.

Product research and development is coming of age in industry. Annual appropriations are rising. Where's the peak? No one knows for sure, but a doubling or tripling of the current outlays in the next few years is considered conservative. It spells out one thing: As competition puts increasing emphasis on "the new, the better and the cheaper," product research and development is becoming a business must.

Size No Obstacle

Says William F. Crawford, president of Edward Valves Inc., East Chicago, Ind.: "Research and development help keep us competitive and maintain one of the best profit margins in our industry." A subsidiary of Rockwell Mfg. Co., Edward Valves has less than 500 employees and ranks tenth in the valve industry. Yet it boasts the industry's largest laboratory devoted exclusively to steel valve research.

You don't have to be a General Electric Co. to have an aggressive research and development program. Nor are tremendous expenditures for elaborate laboratories required. Superior Steel & Malleable Castings Co., Benton Harbor, Mich., which started with just one man in its program, has a five-man team devoted to product development. Facilities cost under $20,000.

The key to an effective research and development program is its integration with other company activities. Research and development used to be considered activities for inventors and scientists working in secrecy.

Today's industrial research and development heads are on the same organizational level as sales, engineering and manufacturing executives. Basic factors in any program are: 1. How much money will be allotted to research and development? 2. What direction will the program take? The decisions involve all members of the top level management team.

Whether you're a large or small company, there's no one best answer to "how much money should we put into research and development?" Says William W. McDowell, vice president in charge of engineering and research at International Business Machines Corp.: "No one has enough money to do all the research he wants. But funds must be allocated so that the director of research is able to make plans and maintain his organization without worrying about major budget changes which will interrupt his schedules."

How Much?

Your particular product and industry will determine to a certain extent how much you spend on research and development. The chart on page 103 showing expenditures as a per cent of sales by industry will give you an idea. The three general bases for determining budgets are:

1. A per cent of sales, net profit or some other operating figure. The average for all metalworking is between 3 and 4 per cent of sales.

This base provides good control on a "how much can we afford" philosophy.

2. A potential returns evaluation of how much research and development have contributed to earnings. Experience is the chief factor here. It isn't always possible to translate the results into dollars and cents.

3. Competition—how much does it take to keep up with or ahead of competition? There is no logical method of determining a budget this way, but comparing your competitors' technological advances with your own can serve as a guide to whether you're putting enough emphasis on research and development.

Sight Setting

Setting program objectives and selecting projects are top level management considerations. Important are: Do we stick only to our field? Do we have an adequate staff and facilities to do project X? If a new product is involved and is successful, can our sales and service departments handle it? Are our production and engineering facilities capable of carrying the project to the production line if research is successful? How shall we divide the emphasis according to time and money between pure or basic research, new product and process development and improvement in existing products and processes?

Large companies usually handle such decisions formally, through research and development boards or committees composed of all major department heads. At Minneapolis-Honeywell Regulator Co., Minneapolis, company plants are managed by division managers who are responsible for research and development work in their plants. However, a research advisory board of top management in the home office reviews the programs being conducted and in this way excercises over-all direction and policy control.

Research is not an activity where results can always be programmed like production. Recommended by most companies: Review your research and development programs each three months, including budgets. Project direction or emphasis may have to be changed; new funds may have to be allotted; termination of a program may be advisable; a new project may have to be scheduled. Changing economic and market conditions as well as competitive developments play an important part in research and development scheduling.

What direction should your program take? Your particular industry, competitive position and size are key factors. If you are in a growth industry like electronics, much of your emphasis will be on new products. If you are in a declining industry, diversification, product improvement and new markets are important.

Market Research's Role

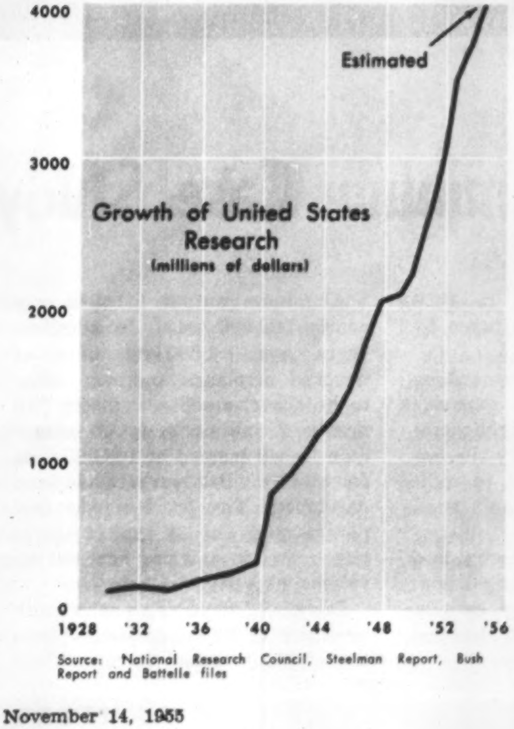
This is where good market research comes into play. In the past market studies have emphasized territory potential analysis, sales statistics and forecasting, price trends and studies, distribution methods, effectiveness of advertising, competitive position, etc. As a partner to technical research and development, market studies can:

1. Uncover market needs not anticipated in the technical research program.

2. Weigh the relative chances of sales success that might be expected from different technical research alternatives or products that are being considered for development.

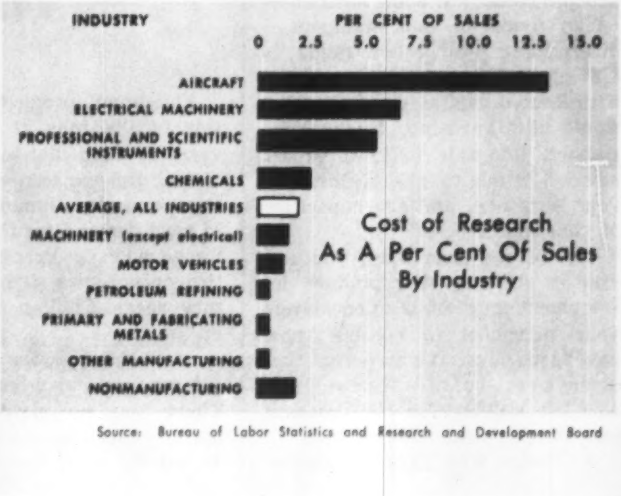
3. Reveal competition not fore-

U.S. Research Soars as Industry Boosts Outlays



Growth of United States Research
(millions of dollars)

Source: National Research Council, Steelman Report, Bush Report and Battelle files



Cost of Research As A Per Cent Of Sales By Industry

Source: Bureau of Labor Statistics and Research and Development Board seen when the technical budget was set up.

4. Discover and evaluate economic and other problems relative to the *use* of products before funds have been spent for research and development.

5. Narrow the number of materials or products meriting research to those having the best chance for customer acceptance by emphasis on use patterns, preferences and economies.

6. Indicate whether products acceptable in all other respects are suited to financial and sales capabilities of the company by describing the characteristics of the market.

7. Aid in ranking attributes probably attainable through technical research according to the importance placed on them by potential customers — recognizing that few products and materials have all the desirable characteristics.

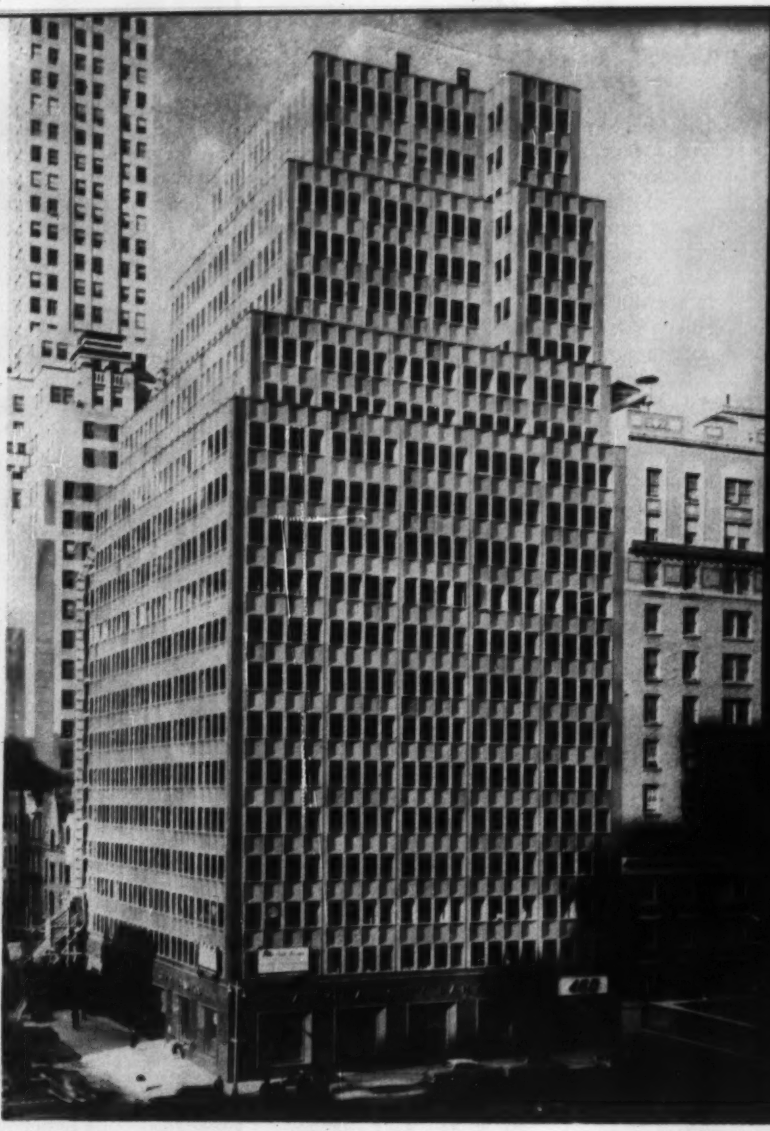
Such information will help direct your activities along one or more of the avenues listed in the checklist on page 108. The two basic approaches for developing markets are: 1. Finding more markets for the items you produce. 2. Developing new products to satisfy existing or potential market needs—diversification.

Matter of Economics

Today, diversification is in high fashion; but there are many who feel some of it is unwise. Hard economics gives priority to finding additional markets over bold ventures into entirely new processes and products. For some companies —like foundries and stampers— diversifying into other fields is difficult. For the small company with limited capital, diversification would be a hardship. In these instances, it's wise to heed expert advice: Stick to the abilities of your personnel and the capacities of your facilities.

One of the first steps you can take in starting your product development program is to encourage your personnel to become "new idea" conscious. It's an across-the-management-board process, not one left strictly for the research and development "ideamakers."

At Dodge Mfg. Co., Mishawaka,



Alcoa

Aluminum: Case Study

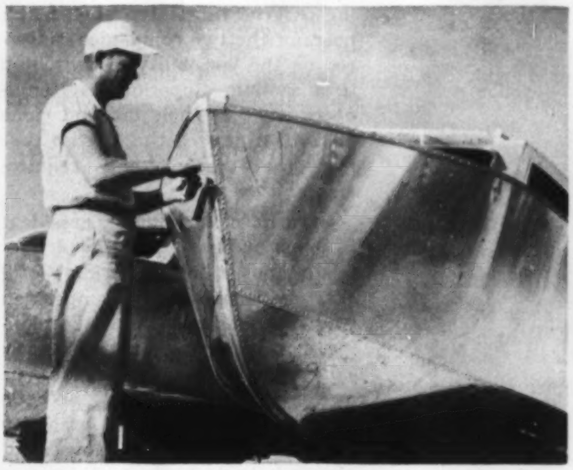
Aluminum production in 1939 was 163,000 tons. It had taken 51 years to reach that total.

With the war came a tremendous expansion in aluminum capacity to meet demand for the light metal for warplanes. Practically the entire output was diverted to military needs. Civilian demand dried up.

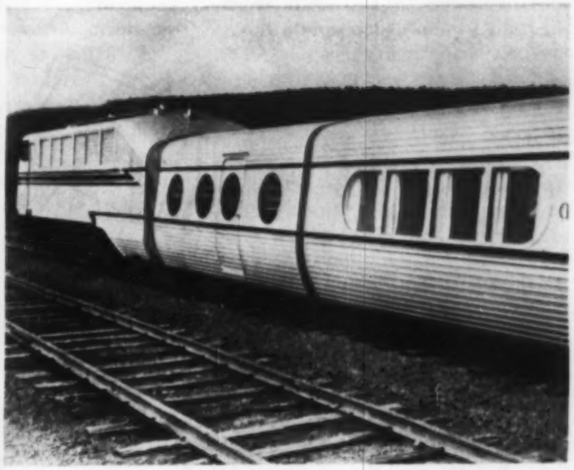
After the war, the industry had a huge emergency-born expansion. There was no matching civilian market. Military demand dropped as quickly as it had risen.

Aluminum output in 1945 was nearly 500,000 tons. In addition, there were 1,500,000 tons of wrecked airplanes and war scrap to be absorbed. The industry had nearly 2 million tons of aluminum to sell instead of 163,000 tons for which civilian markets had been developed. The problem was desperate, and out of that desperation came an amazing market development story.

David P. Reynolds, sales vice president of Reynolds Metals, says this: "We just had to mount our



Kaiser Aluminum & Chemical Corp.



Alcoa

Reynolds Metals Co

U.S. Aluminum Production

(in net tons)

1939	163,545	1950	718,622
1940	206,280	1954	1,460,565
1945	495,060	1955	1,500,000

Projected Capacity

1950	2,000,000	1970	3,000,000
1965	2,500,000	1975	3,200,000

in Market Development

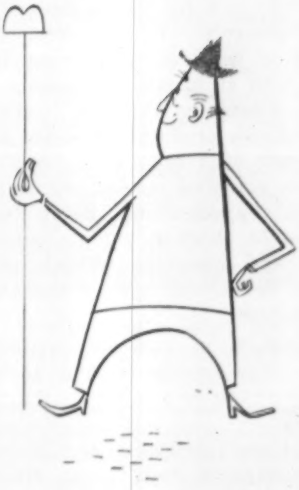
horse and ride off in all four directions at once. It was necessary to throw tradition, precedent and caution to the winds . . .

"We faced the tremendous basic problem of conditioning the public to aluminum and making them recognize and accept it. Fantastic as it seems, we selected foil to be our champion. Here was a product that told by example many of the properties of aluminum and yet could be purchased almost anywhere for 25 cents . . ."

Foil helped educate the public to aluminum, but foil alone could not carry the load.

Aluminum producers carried their story to the construction industry (now No. 1 consumer), to transportation (No. 2), to home appliances (No. 3), to the electrical industry and to hundreds of miscellaneous consumers.

Result: This year 1.5 million tons are being produced and consumed. And the industry is starting a new program of expansion that will carry capacity to 3.2 million tons by 1970.



To Keep Your Product Growing, Check These Avenues for Action Via Research and Development

1. Modify your product for better features, better appearance, better functional characteristics
2. Seek new materials which will improve quality or permit price reduction
3. Look for new applications for the product which can be accomplished with few modifications
4. Simplify manufacturing processes
5. Develop labor saving equipment
6. Create commercial value from waste materials and by-products
7. Develop new products totally different from existing line
8. Improve quality control, reduce hand inspection

Ind., the idea for its "taper-lock" was presented to management. While it was being developed in 1944 with all members of management consulting at times on the project, the product was aimed at all users of V-belt drives. A $2-million potential market was estimated. Applications began to spread to sheaves, pulleys, couplings and sprockets, officials report. Today, the market exceeds $10 million.

Salesmen in constant contact with your customers and their problems can be a prime source of ideas.

Customer problems should be a challenge to modify your product or develop a new one to meet their requirements.

Try approaching customers and potential customers this way: "I think I can help you put out a better product by designing my component to fit your needs." Too many today operate on this basis: "I have a good product; here it is; design your product to use it." An eastern diecaster proved the value of the first approach. He went to a power lawnmower maker and suggested a redesigned mower using diecastings. Result: The lawnmower maker's sales went up; so did the diecaster's.

Get a reputation for that kind of product development aggressiveness and the customer may come to you. A major truck producer went to Superior Steel & Malleable Castings with a problem concerning a large fabricated part. Engineers of the two companies conferred on the possibility of switching to a casting. Superior Steel engineers went to their lab and came up with a new casting design that met the truckmaker's requirements.

Says Ross L. Gilmore, president of Superior Steel: "The foundry industry took a licking during World War II because our competition was more aggressive in developing new products and processes. To recover, we've got to do our own product development." What's the payoff? Mr. Gilmore estimates that between 20 and 25 per cent of his company's business this year will be the result of its product development program.

Research and Forecasts

If you're an aggressive company, your sales organization makes periodic market studies to determine competitive position and predict market trends. Why not bring your research activities into the program to add another important factor in market predicting — the obsolescence factor?

Minneapolis-Honeywell is setting up a sales and technological change forecasting system. Taking its thermostat and heating equipment line, which includes 11 types of products, sales for the last three years are charted and projections for the next four made.

Here's what the study shows: Over-all market available for the products; Minneapolis-Honeywell's sales and share of the market; product changes and improvements in the past.

By bringing in research and development, estimates can be made of what to expect technologically—based on current work and projected research. In estimating future sales, then, anticipated product changes and improvements and the impact they will have on the market can be taken into consideration. Possible, too: Estimated production equipment and tooling changes required for the period.

Minneapolis - Honeywell's plan also includes two sales estimates, G. E. Seidel, vice president in charge of engineering and research points out. One is based on minimum engineering and research effort, the other, on maximum engineering and research effort. "We are going to use it as a guide to the amount of emphasis we should give each product from year to year," says Mr. Seidel.

The Specialists

Don't overlook the role of outside sources for your research and development activities. For the small company without the staff or facilities, outside organizations offer the best in talent, experience and facilities. Companies with large laboratory facilities can also use outside agencies to advantage --see checklist below.

You have a large field to select from: Contract research organizations like Arthur D. Little Inc., Cambridge, Mass; nonprofit organizations like Armour Research Foundation in Chicago, Mellon Institute in Pittsburgh and Battelle; and the some 2800 universities and colleges that can provide research services.

Costs will vary. Battelle officials report that a minimum technical study could cost as little as $4000, a straightforward marketing study to support it, $6000.

Elgin National Watch Co., Elgin, Ill., which has its own extensive research laboratories, spends about 20 per cent of its research dollars for outside services. George Ensign, director of research, says Elgin's experience shows that outside research costs them an average of $1500 per month for each man assigned to the project.

Research and Development Organizations

What they have to offer—

1. Wide variety of expensive, specialized equipment and facilities
2. Highest type scientists and personnel with diversified experience
3. Fresh approach and viewpoints to your problem

You should use an outside organization—

1. When your staff or facilities are not adequate to tackle the project
2. When you lack capital for investment in new equipment necessary to conduct the project
3. When the area of investigation is outside the experience and interest of your own research group
4. When you are out of ideas and feel the need for a fresh approach and different thinking on the problem
5. When the project requires a great diversity of specialized talent
6. When your staff is overloaded with other projects
7. When technical manpower problems thwart your efforts
8. When you don't have a laboratory or research group

Don't use an outside organization—

1. Just to see how someone else would tackle your problem
2. To compete against your own group

"These organizations," says Mr. Ensign, "offer more millions of dollars worth of equipment, with operators to use it, than we could dream of buying for our own labs. The consulting aspect of our relationship is invaluable because of their large, varied staffs and experience with all facets of industry."

In selecting an outside organization, check these factors: Reputation, both as an organization and in the field in which your problem lies; personnel abilities and lab facilities to tackle your problem. Talk with other sponsors about their experiences with the organization. Visit the laboratories and talk with the men who'll be assigned to your project.

Home Rule

Another point: Give considerable weight to the location of the facility. Close liaison between your home staff and the outside group is important. Elgin always assigns one man from its laboratory to work with the person in charge in the direction and control of the project. "We insist that the project scientist keep us fully informed of his progress, troubles and moves," says Mr. Ensign.

One area in which an outside organization's ability will usually excel that of your own is in research involving the "off the main line" markets. Generally, it pays to stick to your own markets, but there are many instances where the hinterlands offer valuable opportunities. Two examples: Using glass for fishing rods. Using copper as an ingredient in fertilizer and paint.

The $64,000 Question

Can you put a dollars and cents value on results you should expect from each dollar invested in research and development? The answer is no. But there are several factors you can use as a yardstick to evaluate your program.

IBM's William McDowell and

SEED
FERTILIZER

Product Development and Improvement Depend Upon . . . Ideas: Here's Where To Look for Them

1. Your company personnel

Develop employee suggestion systems

Encourage research, engineering and market research men to become "new idea" conscious

Pay particular attention to all customer suggestions, inquiries and complaints for ideas

Salesmen, because of their outside contacts, should be one of your best sources for new ideas

2. Competitors

Check their products, advertising, catalogs

3. Trade Associations and Shows

Industrial and trade shows generally have a "what's new and wanted" theme. Attend those not only in your own industry but those of your customers. In addition to getting ideas for new products and improvements, you may spot developments in other materials or processes which point to future competition that you can take immediate action to combat

4. Government Publications

Check the catalogs, booklets and indexes of these agencies: Departments of Commerce, Agriculture, Defense; Small Business Administration, U. S. Patent Office, research and development groups

The patent office files contain millions of inventions and designs covering every phase and facet of industry. Whether old, new, expired or dedicated, these patents are a source of new product and improvement ideas

5. Business Publications

There are over 2200 in the nation. Their advertising and editorial pages are one of the best sources of ideas

most executives feel that the chief factors are: 1. Are you meeting the needs of your customers? 2. For the most part, are you doing it ahead of the competition?

Pure or basic research is for scientific knowledge without regard for specific commercial objectives. The farther you get away from it (move toward project or process improvement) the easier it becomes to measure results accurately.

One executive estimates a return of $10 for each dollar invested can be expected with a product improvement program.

Although it'll raise the eyebrows of the controller, most executives admit that "feel" and "hunches" based on experience and educated "guesstimates" play a big part in determining how much money should go into each particular project.

Here are some other factors involved in evaluating your research and development program:

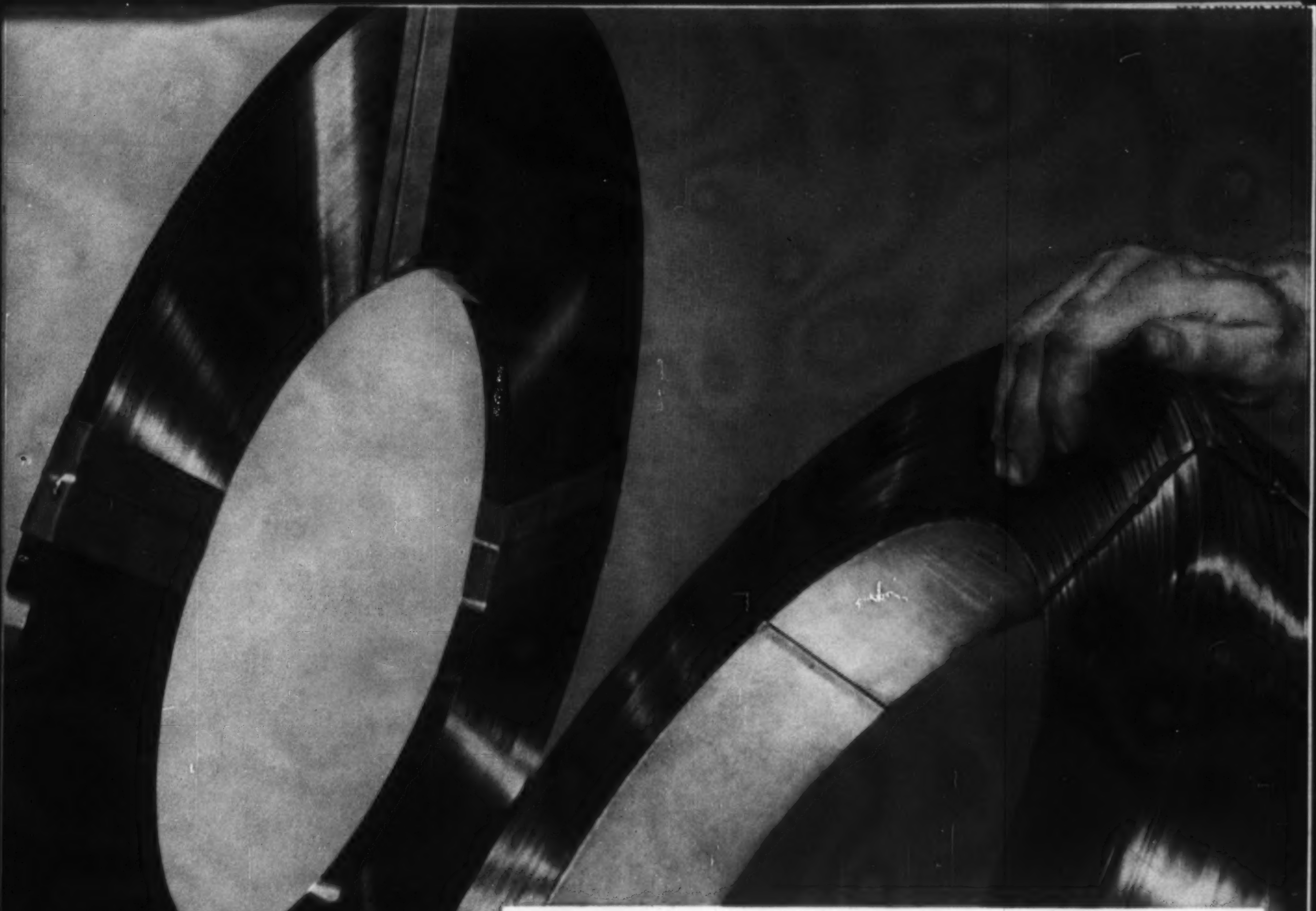
1. Are you satisfied that your product is keeping pace with the times?

2. Does the number of unsuccessful projects exceed the number of successful ones in your program? Again, this will depend upon the type of program. But many executives believe a batting average of 50 per cent or better should be expected if projects are properly screened. On the product and process improvement levels, the percentage should be much higher.

3. Don't overlook publicity values. It's another intangible, but dividends in reputation building can't be denied. Few consumers can name more than a half dozen projects that General Electric is working on or has completed. But find one who can't link the slogan "Progress Is Our Most Important Product" with GE.

Putting out the best product in your industry today and having the lion's share of the market doesn't assure you of a thriving business ten years from now—or even five, if you're in an industry undergoing rapid technological change. You've got to keep your product growing to keep up.

Business is like a foot race: Product research and development will help you run a better race.



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Nothing finer!

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"Our records show that when a manufacturer once discovers the uniform quality of Roebling flat spring steel, he becomes a steady Roebling customer."

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(PD) POSITIVE DUPLICATION

CINCINNATI
Grinding Wheels

A PRODUCTION-PROVED PRODUCT OF
THE CINCINNATI MILLING MACHINE CO.

STEEL

November 14, 1955

Technical Outlook

UNVEILING—Visitors saw several new products at the dedication of Jones & Laughlin's Graham research laboratory. They included fabricated parts of aluminum coated steel made by a new cold cladding process and parts made from plastic coated steel. Both are being produced in pilot line operations. Visitors were told that truck tires using brass-plated steel wire as cording are setting phenomenal endurance records.

ON A LARC—The Livermore Automatic Research Computer (LARC) is $2,895,000 worth of Univac-type electronic brain which Remington Rand will build for the AEC. That and 2½-years of labor will result in a computer 1000 times faster than any in use. It will work on several problems at once and in three dimensions.

VAPOR PLUGS—Because overnight corrosion can stop a jet as surely as bullets, the Navy has a special interest in vapor-type corrosion inhibitors. An Arthur D. Little Inc. research team came up with air-tight plugs that can seal off an engine and produce a corrosion-inhibiting gas inside. Starting the engine clears out the inhibitor. Other possibilities: Corrosion prevention in sealed buildings, containers and holds of ships.

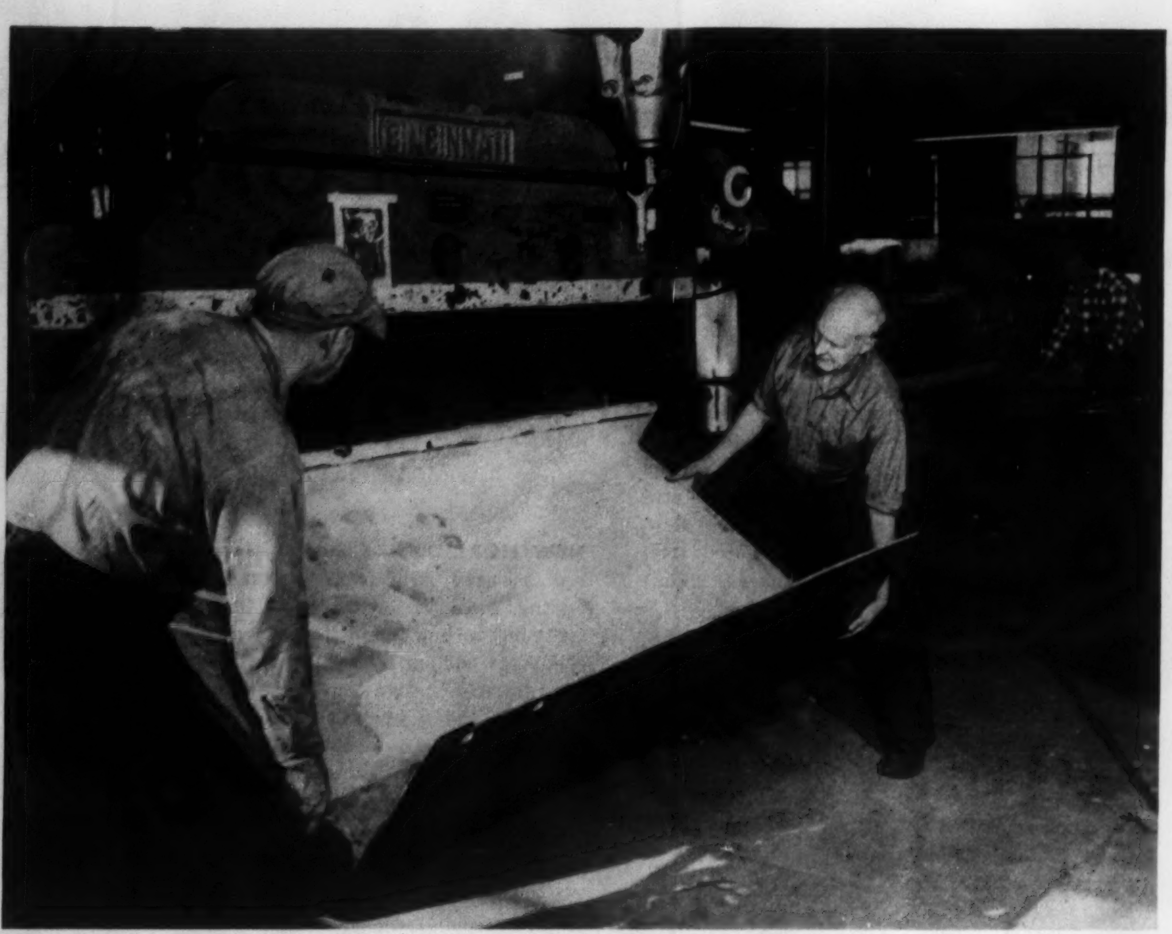
LESS NOISE—An electronic sound absorber RCA is working on may be the answer to industrial noise problems. Possible applications given by Mones E. Hawley at the National Noise Abatement symposium: 1. Reduce machinery noise in the vicinity of the operator's head. 2. Reduce general room noise. 3. Eliminate noise for a passenger in an airplane or automobile. The device: A microphone, an amplifier and a loud-speaker connected to form an electro-acoustic feedback system that reduces sound pressure variations in the vicinity of the microphone.

NEW HORIZONS—Chemical plating (no current is used) will expand frontiers of nickel plating, says Victor Chemical Co. It is constructing a new plant to provide the needed chemical—sodium hypophosphite. Parts of the most intricate design can be plated with extreme evenness. Pinholes and thin spots are eliminated. Threads on a bolt are plated with such accuracy that it fits the nut perfectly.

ON THE RUBBER FRONT—Here's a handful of ideas from B. F. Goodrich: Water-lubricated rubber bearings (now used on ship propeller shafts); Koroseal vapor barriers for fire-retarding roofs; Koroseal pipe joints for clay sewer tile; Koroseal abrasion-resistant floor matting; rubber heels that won't mark floors; rubber "ears" for submarines that pass underwater sounds without distortion; and extra-low vibration belts.

FOR HOT SPOTS—Coils insulated with silicones are used in the induction heating process for steel ingots at the Vancouver Rolling Mills plant of Western Canada Steel Ltd. (see STEEL, May 16, p. 124, for details of the operation). Parts of the coil are less than 1 in. away from the white-hot ingots, reports the silicone maker, Dow Corning Corp. When sections of the refractory material used for thermal insulation have been rubbed off or broken, the silicone insulation held up well under the sudden increase in temperature. The coils have been going two shifts daily since July, 1954.

Metalworking Outlook—p. 53   *Market Outlook—p. 159*



These two operators are brake forming a stainless sheet protected with paper. Kraft or adhesive paper, latex or plastic base solutions used as protective coverings save the polished finish and cut or even eliminate the cost of a final polishing operation

How To Form Stainless Steel

Here's a guide and some facts to help you find the right material and the best method

THINKING about forming stainless steel? Here are some tips on equipment and operator skills required.

Study Part—Maybe your contract calls for drawing a shallow cup. You have free press time, but the low volume hardly seems to justify die expense. Rubber dies cost little, do much to help low volume producers.

Don't ignore roll spinning. Look into the possibilities of getting additional work to amortize the cost of a new machine.

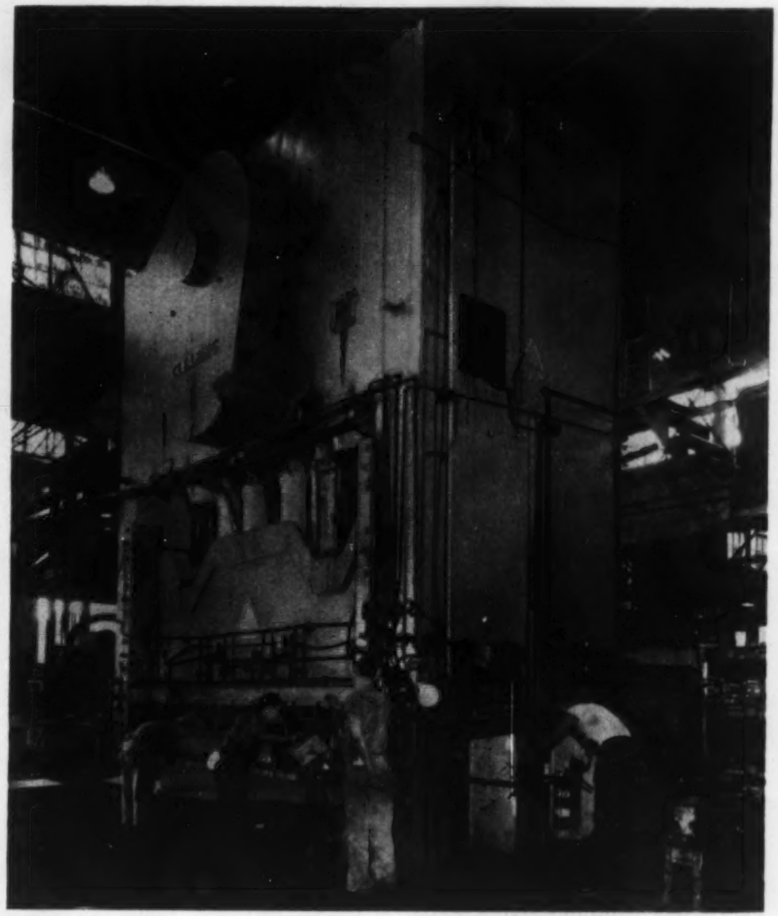
Materials—If you can't figure a way to use your machinery, and the material specified won't adapt to your methods, try other stainless types. Stainless manufacturers have many new variations.

You'll want to use STEEL's Metal Selector (Oct. 10, p. 146). It lists stainless steels by AISI number, giving chemical compositions and physical properties.

The equipment you will select may be a more difficult phase. In addition to the familiar presses and rolls, there are hydroformers, roll and drawbench formers, drop hammers, roll benders, wiping machinery, wrap and stretch formers, upsetting and cold formers. To assist you, see STEEL's equipment selector (page 114).

Forming — In considering such operations, these are important:

1. When annealed, most stainless



Commercial Shearing & Stamping Co.

This 2000-ton, 4-story press formed the stainless steel panels used on the new Socony Mobil building in New York

steels are half again as hard and strong as carbon steels. Greater power must be used.

2. Austenitic stainless steels work harden about twice as fast as carbon steels. Be sure to plan for annealing.

3. Plan for overbending to compensate for greater spring back—roughly double that of carbon steel.

4. Buy the right surface protection from the mill. Suppliers provide paper or other easily removed coatings to protect polished finishes during forming.

5. Most forming calls for lubrication. Lubricants come in a bewildering variety. Ask several suppliers for samples. Try them. Keep cost and result records. Use the best.

6. Study the finished product carefully if it's used in corrosive liquids or vapors. Severe cold working strains eventually show up as fractures and are the source of plenty of latent headaches. Annealing after forming will eliminate such difficulties.

Brake Forming—Brakes are indispensable to the miscellaneous and small production shop. A wide variety of multipurpose dies are available that can be used to form several shapes from each die. Be certain the dies are well polished to prevent marring the finish of the material. To avoid ironing, figure about 10 per cent of the material thickness for die clearance. Set the press for short strokes to avoid fouling and scoring.

Continuous Roll Forming — Long, continuous, molded sections are the feature of this process. The rolls are contained in a series of heads or stands, are interconnected and power driven. Lubricants vary from water soluble oils to soap and extreme pressure oils. The process is most economical for long lengths, continuous runs.

Three-Roll Forming—Sometimes called "crown mills," these rolls generally require two operators, one to hold the sheet being formed and the other to adjust roll settings and operate the power feed. This is a flexible machine for miscellaneous jobs that require simple or compound sweeping curves in sheet material.

Draw Bench Forming—It is similar to roll forming, except that strips are pulled through idling rolls by a power head. Somewhat closer tolerances can be expected than with roll forming. Lubrication generally is not used. Roll design should use the sharper radius on the female rather than the male die.

Press Die Forming — As with carbon steels, two-piece dies used with standard press equipment offer the most versatile forming method for high production. Allow for higher forming pressures than those commonly used for carbon steels. Ordinarily, form dies use no hold-down pads, although cushions are used to clamp the web and eject the part.

This article was prepared with the assistance of Crucible Steel Co. of America, Pittsburgh.

Rubber Die Forming — Both Guerin and Wheelon processes are used. The more common Guerin utilizes a simple rubber pad for the female and a contoured punch for the male section. Single action presses are widespread, although hydraulic presses up to 5500 tons are found in larger shops.

Drop Hammer—This is normally a slow production, high operator skill method. It's the only way some parts can be made economically. Odd contours that wrinkle and sharp corners that split when other forming methods are used are handled easily. If zinc alloy dies are used, and the stainless steel is for high temperature service or will be welded, pickle first to remove all traces of zinc.

Roll Bending—The method is rated as the most effective means of contouring a sheet to a constant curvature in one or two directions. Three-point loading and wiping plus forcing or guiding of the material by the operator, provide excellent flexibility in bending variable or compound curves.

Wiping—Formed sections made from roll formers or draw bench formers are frequently bent by this method. One end of the part is clamped to a male block. The wiper is either a fixed sliding block or a roller. To form the part, either the male die is turned while the wiper is stationary or the male die is stationary and the wiper is rolled or drawn around the male die. This method is popular for variable radii in a single plane. It requires lubrication.

Wrap, Stretch Forming—There is practically no spring back. The method is used for large, smoothly contoured surfaces. Use light lubrication in the center of the stretch die, heavier at the ends. Several excellent stretch formers are available, although some manufacturers use single-action mechanical or hydraulic presses.

Spinning and Rolling — Hand spinning is an old stand-by in the small production shop. It's used to make a wide variety of parts successfully and economically. Newer equipment is available that uses mechanically operated rolls. Higher production and lower costs are possible with many shapes that formerly were only hand formed. As the size of the parts and the complexity of curves increase, spinning becomes more economical than die forming. Be sure to check for adequate annealing.

Upsetting, Cold Heading — The cold upset method is used to make a variety of parts, including bolts, rivets, nails, cotter pins, screws and small components for large, intricate assemblies. Austenitic grades are customarily cold headed up to 150 per cent of the diameter; ferritic and martensitic grades may be cold headed up to 160 per cent. Hot form rods more than ⅝-in. in diameter.

One manufacturer is presizing cast bars with a thread roller equipped with flat dies. Sized bars are then processed in centerless grinders.

Hot Forming — The equipment you have for carbon steels is used, but allow 25 per cent more working effort. Be sure billets are absolutely clean because stainless will not heal. Inclusions, splits and other serious defects are the result.

Heating for forging is more critical than for carbon steel. Heat billets only in muffle, semimuffle or an atmosphere-type furnace to avoid scaling and carburization. Stainless steels absorb heat slowly; heat thoroughly, allowing plenty of time for penetration. Some stainless types are sensitive to sulphur. Check the fuel used.

The cooling rate is important. Austenitic grades must be quenched rapidly to prevent carbide precipitation. Ferritic grades develop improved impact properties from fast quenching. Martensitic types should be cooled slowly, using insulating materials, if necessary.

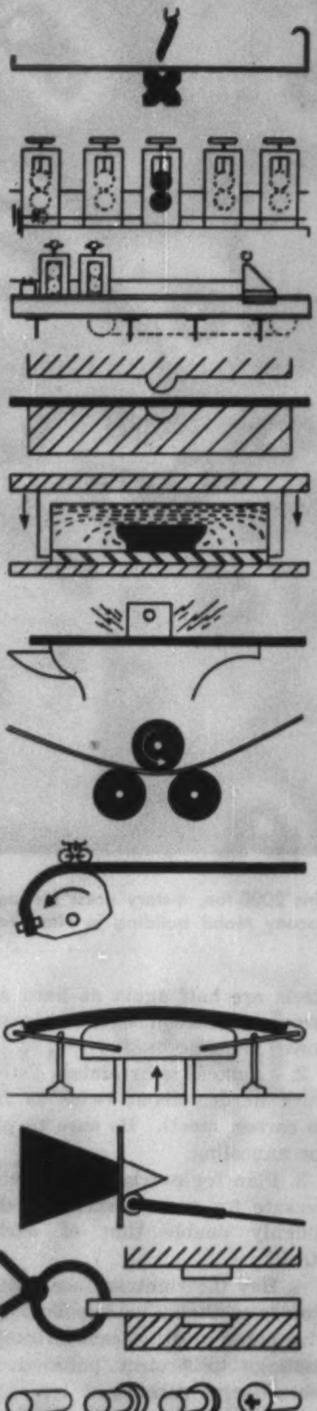
Miscellaneous — Flaring, swaging, beading, bending and hand forming of tubing are included here. When forming flares, watch for too much ironing that can result in a poor seal when the flare is applied to the seat in an assembly. Beading is simple and involves no trouble as a general rule.

A wide variety of bending and forming tools are available for tubing. Press and brake forming is popular if internal cross sections are not critical. When the inside diameter must be kept to close tolerances, various mandrels are used—sheep nose, solid, and flexible. In all cases, lubrication is needed to prevent scoring and ironing.

Explosive forming is a variation of hydraulic forming. Preformed blanks are inserted in a heavy die, usually laminated. The die is partially filled with water, and an explosive is placed inside. The die is capped and the charge set off.

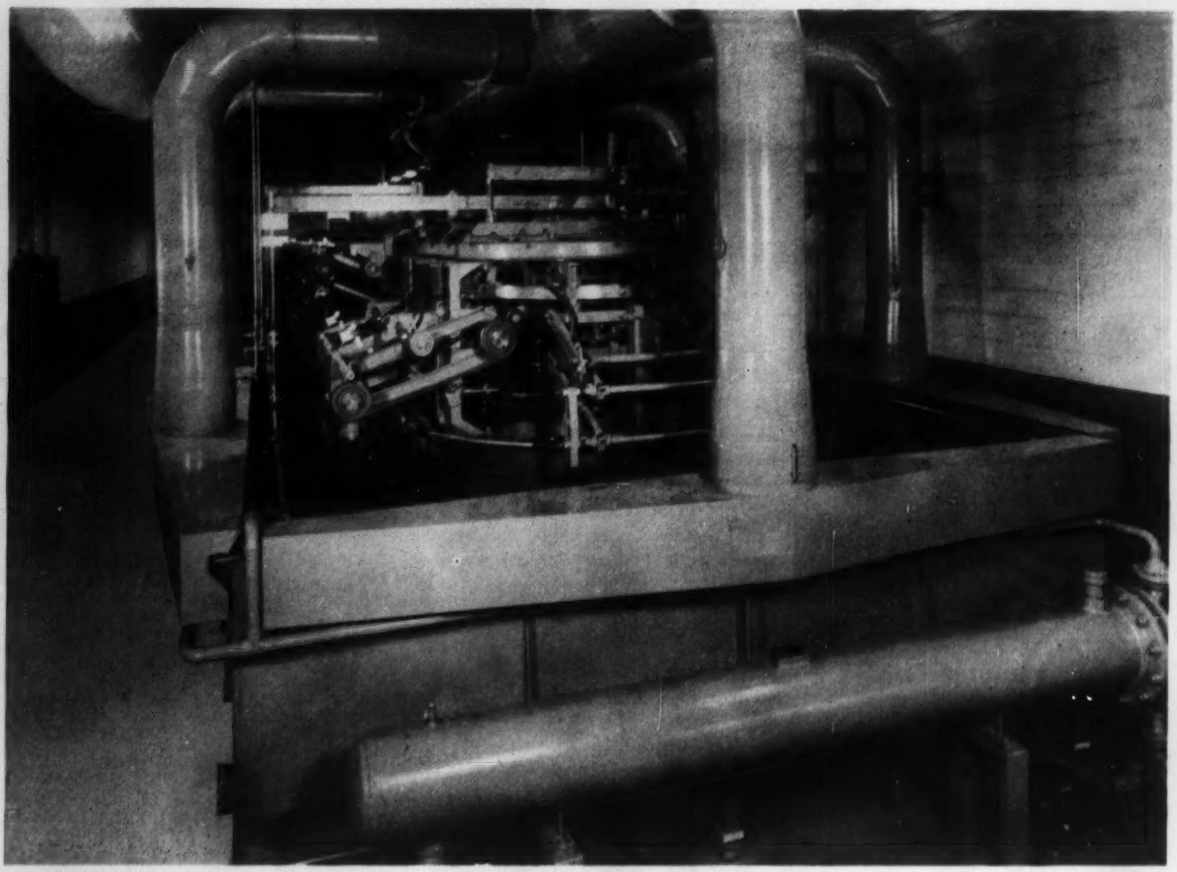
• *Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*

EQUIPMENT SELECTOR



Shape	Tooling	Material	Advantages	Disadvantages
BRAKE FORMING				
Long straight sections, flanges, curves in one plane	Vee, shallow-curved & channel dies	Sheet, plate or strip	Simple, flexible, adjustable. Can form large sheets. Less expensive than press die forming	Some operator skill required; slow
CONTINUOUS ROLL FORMING				
Long molded sections	Power-linked, multiple stage rolls	Coiled strip	Continuous, high volume production	Not adaptable to small production runs
DRAW BENCH FORMING				
Molded sections	Solid dies	Strip	Closer tolerances than roll forming. Greater flexibility	Slower than rolls
PRESS DIE FORMING				
Cups, boxes, deep draw, curved, embossed, wide variety	Various two-part dies	Sheets, strips blanks, plates	Accurate parts, high or low volume, intricate parts possible. Mass production	High initial die cost
RUBBER DIE FORMING				
Straight flanged and contoured, flanged parts	Metal or nonmetal male die only; rubber pads for female	Blank	Low cost	Low volume; blanks tend to move & cause rejects
HAMMER FORMING				
Smooth or sharply contoured parts, dished heads	Zinc, lead, cast iron, steel punch and/or die	Precut blanks	Variable die pressure. Forms difficult shapes impossible with other methods	Quality depends on operator skill
ROLL BENDING				
Curves in one plane, rings, cylinders, cones, curved moldings	Flat & formed rolls	Plate, sheet, preformed strips	Flexibility of adjustment for simple or compound curves	Limited to curves in one plane; some operator skill required
WIPING				
Variable radii in one plane; can use preformed longitudinal section	Steel formblock & slideblock	Preformed or flat strip	More complex curves possible than with rolls. Lower cost than press dies	Some operator judgment required. Slower than dies
WRAP AND STRETCH FORMING				
Contoured sections	Die, and formed holding jaws	Blanks, strips	Low spring back, absence of wrinkling; compound contours	Occasional metal distortion; slow prod.; cut-out and piercing must be done after forming
SPINNING AND ROLLING				
Parts of rotational symmetry	Lathe mandrels, hand or powered rollers & bars	Practically all types of stainless have been spun	Low tool cost. Can form undercuts	Small quantity, considerable operator skill required. Stress cracks occur frequently
***HOT FORMING**				
Heavier, high-strength parts	Standard forging equipment	Blanks	High strength, good metallurgical grain	Trim scrap, costs
UPSETTING AND COLD HEADING				
Fasteners & similar small parts	Heading dies	Wire coils—302 & 410		
MISCELLANEOUS				
Fuel lines, conductors, chemical equipment specialties	Presses, tube benders, swagers, various beading, flaring & hand forming equipment; explosive forming equipment. Hydraulic expanders	Tubes, bars, prepared blanks, miscellaneous		

*Note: Hot forming can be used to avoid strain cracking.



This automatic plating line has an added advantage . . .

Zinc, Plus Choice of Finish

TWO MEN do the work of 10 or 12 (over 6000 lb of zinc plated nuts and bolts an hour) with a new 24-barrel automatic horizontal plating machine. It's at Bellevue Plating Co., Detroit, a wholly owned subsidiary of the National Machine Products Corp., Utica, N. Y.

Taking up only 65 x 14 ft, the line was built by Udylite Corp., Detroit. It includes both a bright dip and a standard dichromate finish, following the zinc plating. First production came off the line in February. Bellevue officials already are thinking about a similar line for cadmium plating.

Tops in Flexibility—The machine operator can set a mechanism at the loading station which determines the processing of each load in the postplating cycle: It can be made to go into or skip the bright dip or the dichromate. Through action of a delayed setdown, it can be retained in either tank for a predetermined shorter time.

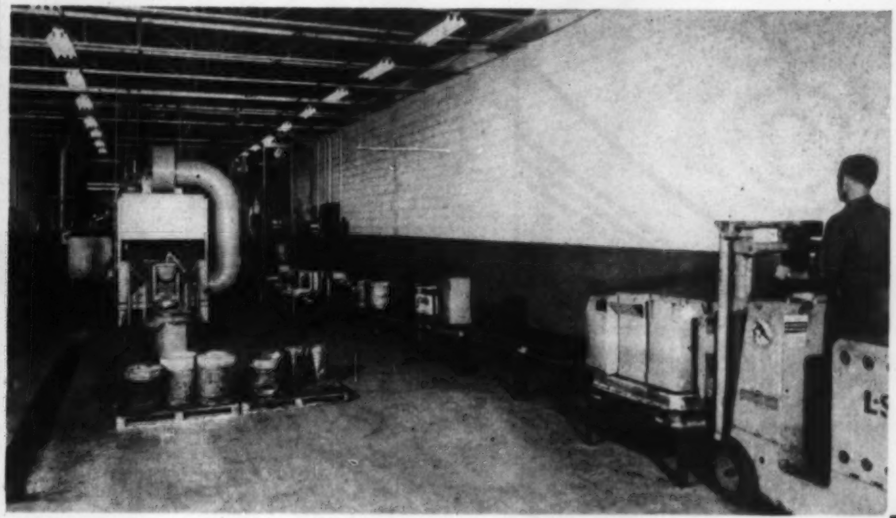
This machine is built for maximum flexibility around the bright dip and dichromating tanks, but similar actions can provide the same versatility at other stations. Barrel cylinders on this machine revolve at slower speeds at the dichromate station, to protect the coating.

Easy Handling—Nuts and bolts arrive and leave Bellevue in the same containers. Samples are taken, and weight tags are attached to each. A record is kept of weight per piece, piece per pound and square inch area—all of which is translated into load per barrel for the machine. The cycle is set automatically.

After a power skip hoist dumps the container into a weighing hopper, a predetermined measure of parts is discharged into a pan which loads the 14 x 30-in. Temp-ron barrels. They pass through an anodic alkaline cleaning cycle, then an acid pickle.

Zinc Next—Preparation stages are followed by an electrified cyanide dip, then the zinc plating. Cycles are 1½-minutes. A coating about 0.0002 in. thick is deposited.

The zinc plating solution is op-



Pallet loads of full containers, already weighed and sampled, are brought to the starting point. Each batch of plated parts leaves the plant in the same container in which it arrived

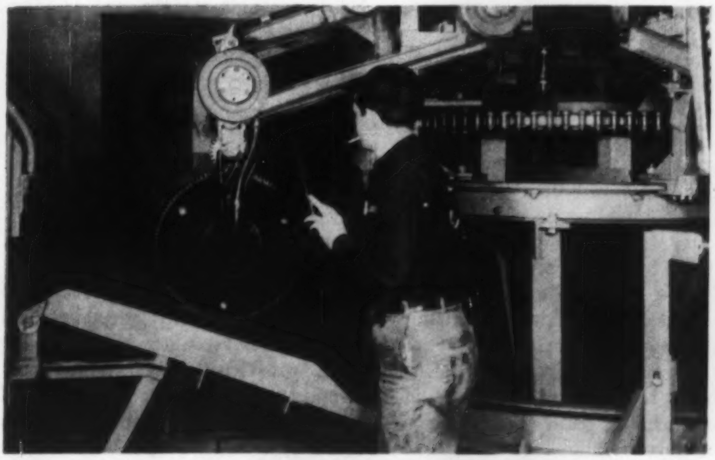
erated at 95 to 99 per cent efficiency, with intermittent filtration. Zinc oxide is added to compensate for lack of sufficient anode area in proportion to metal removed through plating. Current is 11½-amperes per sq ft of area at 15 volts.

Skip Mechanism—Any cylinder at any station is capable of raising or lowering independently of the others. This is done by a delayed setdown or skip mechanism. Such flexibility makes the machine ideal for either of the two chromate treatments incorporated into the line.

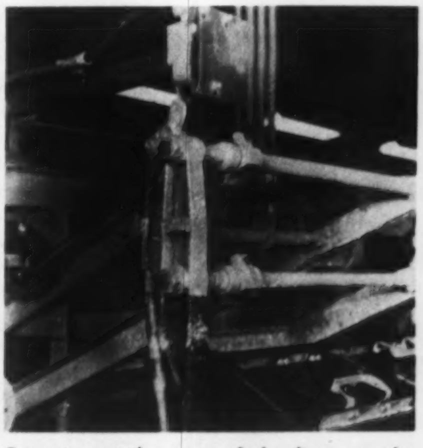
Iridite No. 12, providing a clear one-dip bright treatment, is operated at a 1 to 50 dilution, plus two parts of nitric acid. Immersion is for 6 seconds at a temperature of 90° F, with constant air agitation. Iridite No. 8-2 is used in another tank at a 1 to 50 dilution, with a 20-second immersion at 85° F. The yellow coating produced meets government specifications. Provisions are included for heating and cooling to maintain the 85 degree temperature.

Operations at Bellevue were set up primarily to handle the plating needs of the mother company, but about 20 per cent of capacity is left for job-shop contracts.

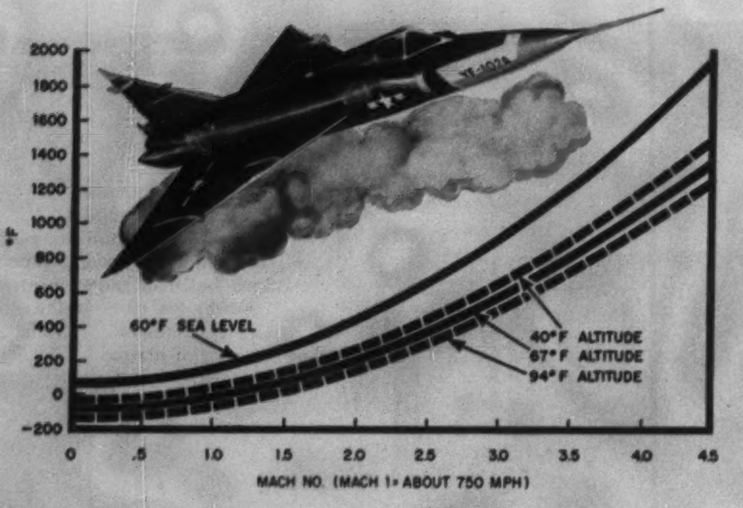
Immediately behind the operator is the loading station. Charges are drawn from the feed hopper. Discharge station is in the left foreground



At the discharge station, operator removes the cover and the barrel's rotation empties the contents onto the dryer conveyor. Parts are dried by warm air in the dryer's four chutes



Operator at the start of the line sets the desired finish by positioning a stop on the upper frame of each barrel. When it flips the pressure switch, cycling is initiated



Research aircraft have conquered air resistance to fly at twice the speed of sound. Beyond this speed a new design problem looms — heat

The Sizzle That Goes with the Swish

AIRCRAFT and missiles flying at 3000 mph—four times the speed of sound—will generate structure temperatures as high as 1150°F. Aircraft builders are experimenting with new materials and techniques that will withstand this terrific heat.

The chart above was prepared by Herbert W. Hinckley, assistant chief engineer at Convair, Ft. Worth, Tex. It shows the temperature rise of structure with increase in Mach number (Mach 1 equals the speed of sound, about 750 mph).

Altitudes are plotted in terms of temperature, −67°F representing the theoretical temperature at the tropopause (about 35,00 ft). Dotted curves on either side bound the probable temperature region future aircraft will encounter.

Heat Barrier—At Mach 2, aircraft structures have to stand up under heat of only 175-250°F. At Mach 3 temperatures go up to 500-650°F; at Mach 4 structure heat soars to 950-1150°F.

These curves are theoretical, taking no account of heat loss by radiation, or heat flow into the interior structure of the craft. Neither do they take into account internal sources of heat in the craft, notably in the region of the power plant.

Materials—What materials will be used? Aluminum and the newer heat-resistant magnesium alloys can be used at Mach 2 up to about Mach 2.5. From there on, up to slightly beyond Mach 3, titanium is suitable; at Mach 3.5, titanium is marginal. Above this point, aircraft builders will have to depend on steels, possibly of the stainless type, or some of the Inconel-type alloys.

What are the structural requirements for aircraft operating at these speeds? 1. The structure must have high strength at high temperatures with no creep. 2. It must have aerodynamic smoothness. No buckling is a necessity, not only to reduce drag, but to maintain torsional stiffness. 3. It must take, without a quilting effect, local bending loads resulting from interior pressurization of the wing or fuselage, in addition to the basic tension and compression stresses arising from normal bending or shear loads.

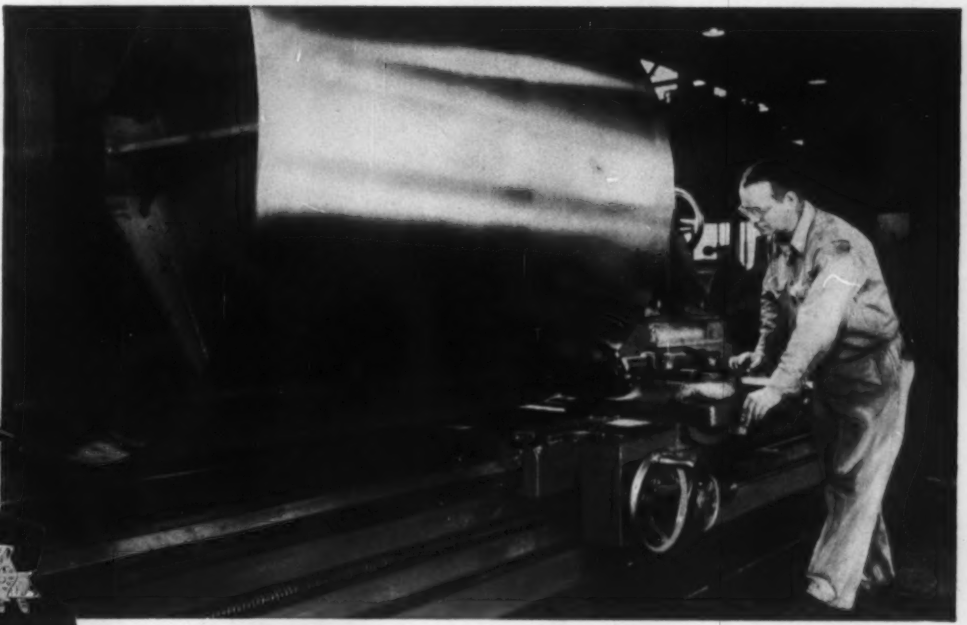
Suitable—Aircraft builders are examining sandwich panel construction for future high-speed aircraft. The closely spaced support points which the core material gives the outer face plates, and the rigidity inherent in its depth, makes this construction ideal.

Other requirements: The panel material will have to be corrosion resistant. Extreme temperature changes produced by wide speed ranges at altitude (and altitude changes themselves) will cause condensation.

Heat Treatable—To obtain desired strength-weight ratios, the metals comprising the faces (at least) will have to be heat treatable. Owing to thin gages required in many places, the normal heat treat cycle of alloy steels would pose a severe warpage problem. Precipitation hardening materials of the 17-7 PH (stainless) type would seem to be the best material.

Edges of the panel must lend themselves to flush-type splices to carry loads to adjacent panels. They must be fabricated so the supporting understructure (spars or ribs) can be attached easily. Both splicing and attachments should utilize easy and rapid assembly techniques with conventional fasteners.

Photo, courtesy Commercial Machining Company, Conway, Pa. Turning 60" dia. stainless steel looping line roll.



STEEL
CARBIDE

Mr. Tooley Says:

"There's ~~more~~ than one way to skin a cat"

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- Operating speeds 25%—50% faster than ordinary high speed steels
- Longer tool life
- Cuts costs by increasing production
- Particularly suitable for cutting tough alloy and stainless steels

FIRTHITE

STANDARD TIPS, TOOLS, INSERTS AND HOLDERS

- Highest metal removal rate
- Uniform, dependable Firthite quality and performance
- Large stocks of standard tools and tips for immediate delivery
- Mechanically-held and brazed designs

Yes, in the field of tooling, alternative cutting materials make it possible to utilize the same production equipment for a variety of applications. In typical turning operations either Firth Sterling High Speed Steel or Firthite Sintered Carbide cutting tools may be selected . . . depending upon the characteristics of the metal and the production requirements of the job.

Firth Sterling, manufacturers of complete shop tooling needs, occupies the unique position of providing *both* steels and carbides to "skin the cat" of production in the most economical and effective ways. Thus, from *one* dependable source of supply you are assured of (1) completely unbiased tooling recommendations and, (2) the selection of the exactly right carbide or steel or *both* to provide maximum production!

Both Firth Sterling's famous CIRCLE "C" Super High Speed Steel and FIRTHITE Sintered Carbide cutting tools and tips are used alternatively for most metal removal operations. Write now for literature and unbiased recommendations for your specific needs.

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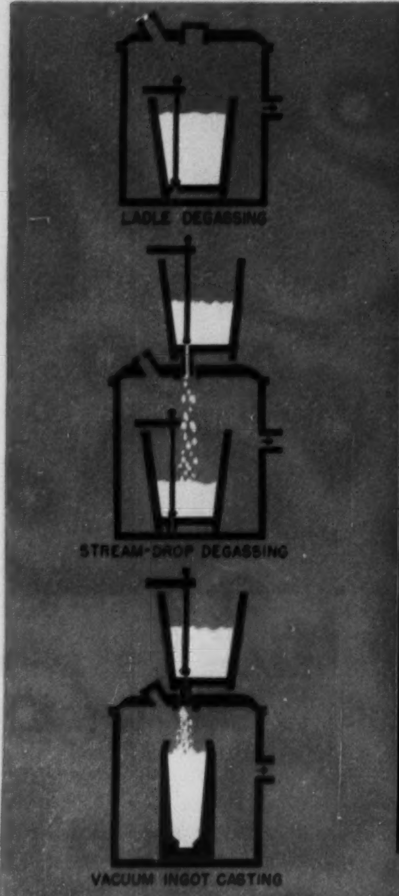


Vacuum degassing at Bochumer Verein A.G. in Germany. National Research Corp. is introducing the process into the U.S.

Out Goes Hydrogen

TONNAGE STEEL degassing along lines developed by Bochumer Verein A.G. in Germany is ready to make its appearance in U. S. mills. Major steel companies making large forging ingots will probably be first to adopt the process.

They've been following BV's vacuum operations carefully for several years. During that time, it has cast more than 15,000 tons in its vacuum vessels at Bochum, West Germany. Some of the vacuum-cast billets weighed 150 tons.

Hydrogen Out—The process gets rid of hydrogen, frequently responsible for flaking and hair-line cracking in forging ingots. Degassing is carried out in large, low-pressure vessels working in combination with ladles of special design.

Three variations are possible: 1. Nozzle (stream-drop) degassing by teeming the contents of a ladle into a second ladle in the evacuated chamber. 2. Vacuum-ingot degassing while pouring into an ingot mold in the evacuated chamber. 3. Ladle degassing followed by casting in ordinary atmosphere.

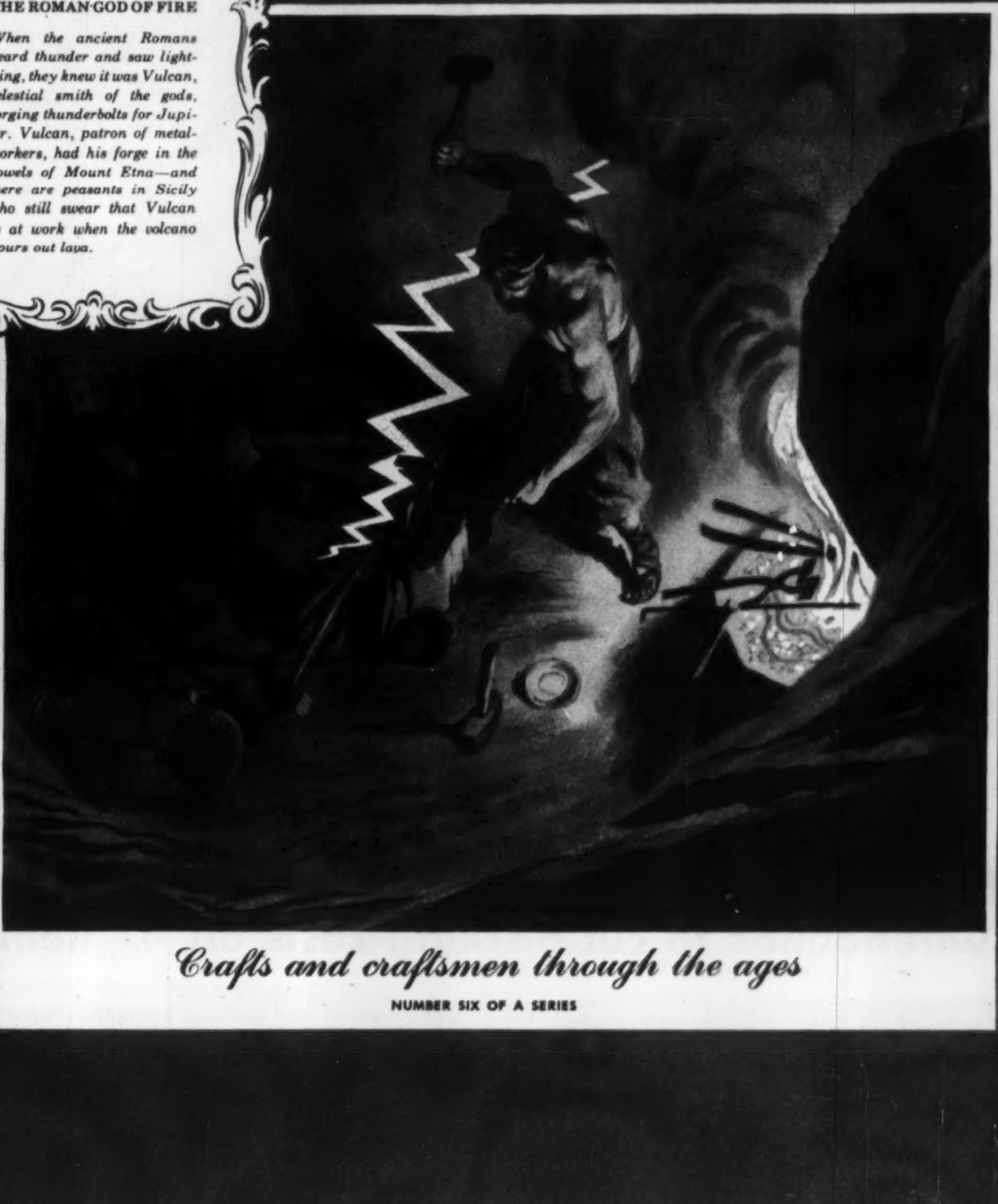
Gas Tight — BV has neatly solved a mechanical problem for bottom pouring through a gas lock into a vessel in the evacuated chamber. The primary gas lock is simply a sheet of aluminum that seals the teeming hole in the chamber cover. A secondary gas lock is achieved by seating the ladle base tightly on the chamber cover above the aluminum sheet.

When the ladle is teemed, the molten stream melts through the aluminum, while the ladle seat maintains the vacuum seal.

Refractories—All ladles, the one into which the furnace is tapped, the intermediate ladle which sits on top of the chamber, the ladle within the chamber and the chamber itself require special insulation to keep heat losses as low as possible. In addition, refractories

**VULCAN,
THE ROMAN GOD OF FIRE**

When the ancient Romans heard thunder and saw lightning, they knew it was Vulcan, celestial smith of the gods, forging thunderbolts for Jupiter. Vulcan, patron of metalworkers, had his forge in the bowels of Mount Etna—and there are peasants in Sicily who still swear that Vulcan is at work when the volcano pours out lava.



Crafts and craftsmen through the ages

NUMBER SIX OF A SERIES

Enlargements of illustrations available upon request.

Basic Refractories not only furnishes its customers with the finest refractories available, but also employs skilled craftsmen —men with practical steelmaking experience— to insure that the use of these products gives full value.

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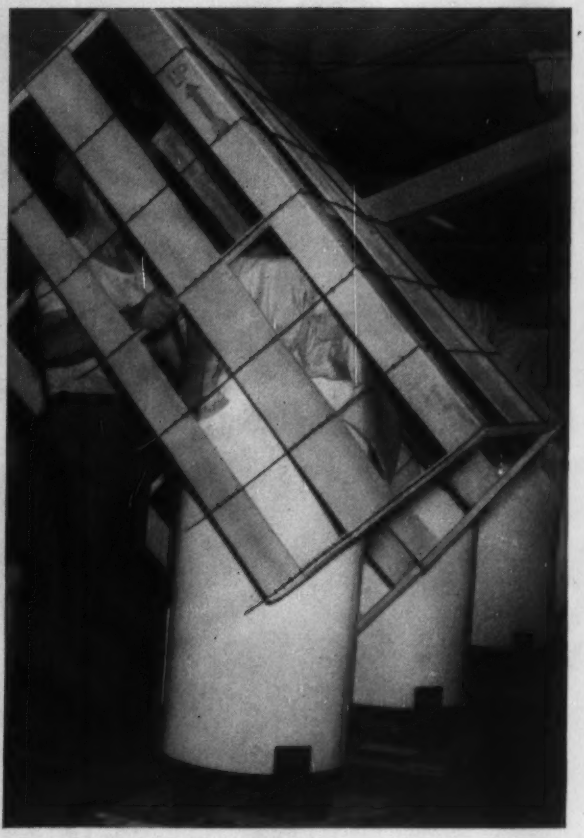
REFRACTORIES ENGINEERING AND SUPPLIES, LTD — EXCLUSIVE CANADIAN AGENTS

GRANULAR BASIC
REFRACTORIES

This coal circulator weighs 539 pounds. It's assembled on base of wirebound crate. Total man-hours for packing come to just 6 minutes.



Water heater bases are bolted to wirebound crate base before assembly. At this point, only 3 minutes are needed to complete crating.

Appliance maker uses 17 General-engineered wirebounds to cut packing costs on 47 items

Gray and Dudley Co., Nashville, Tenn., obtained the figures on packing and shipping costs using wirebounds designed by General Box Company, and compared these with the costs of making their own shipping crates. The study covered 47 different designs and sizes of electric water heaters, electric and gas ranges, oil circulators, coal circulators, cast iron ranges, army ranges, and their spare parts. Wirebounds won a clean decision.

Comparison was made on the basis of man-hours for packing, shipping weights, and over-all packing costs. In the case of a 539-pound coal circulator, for example, the saving was 80% in man-hours, 10% in shipping weight, and 16% in over-all packing cost. The assembly and packing operations were integrated to save handling costs; noise and dust were eliminated, and the appearance of the products in transit was improved. The crated products have a Safe Transit O.K., too.

It's easy to find out how much General-engineered wirebounds can save you. Let us send a man. No obligation. Just write General Box.

Factories: Cincinnati; Denville, N. J.; East St. Louis; Detroit; Kansas City; Louisville; Milwaukee; Sheboygan; Winchendon, Mass.; General Box Company of Mississippi, Meridian, Miss.; Continental Box Company, Inc., Houston.

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General Box

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★ ★ ★ ★ ★

Applications for Vacuum-Degassed Steel

Type of steel	Use	Advantages
Engineering and forging steels for large ingot sizes	All purposes	No flakes, reduced tendency towards secondary pipes, less cracking in ingot surface after solidification, better hot forming, shorter production times
Steels for castings	All purposes	Better flow properties, prevention of blow holes, better surface, fewer solidification cracks, improved toughness
Steels for high temperature service (maximum percentage of alloy constituents)	Turbine rotors, castings, blades, exhaust-gas turbines, jet motor parts, stoker screws, resistor elements, boiler parts	Improved casting conditions due to reduced oxidation, good forging properties, higher degree of purity, reduced brittleness
Corrosion-resistant steels	Rustproof sheet metals, chemical plant materials, nonmagnetic parts for all usages	Improved casting conditions due to reduced oxidation, good forging properties, higher degree of purity, reduced brittleness
Magnetic soft steels	Large magnets, transformer sheets	Prevention of oxidation, better castability with large additions of aluminum, better hot forming, higher degree of purity
Thomas steel, bessemer steel, oxygen blown steel	Construction steel to meet higher standards	Reduced gas content, increased degree of purity, less phosphorus and sulphur content

within the chamber must take into account the effect of vacuum on chemical reactions.

These special requirements have been achieved without any great rise in refractory costs.

Stream Degassing—When pouring in vacuum, degassing takes place within the molten stream. The stream literally explodes into droplets as the gas effervesces from it. The process can be seen with great clarity through a quartz glass observation port—the vacuum whips away the smoke and fumes that normally obscure a pouring operation. It's a cooler operation, too, with most of the heat confined within the chamber.

Up to 10 tons of metal can be poured per minute, although degassing a 40-ton charge normally takes about 8 minutes and entails a drop in metal temperature of about 100°F.

Vacuum Casting — Degassing from ladle to ladle has the disadvantage that ingots must be poured in the air, so that some subsequent hydrogen pickup is likely. To produce premium quality ingots for forgings, the ladle within the chamber is replaced by an ingot mold.

The largest molds Bochumer Verein has used run about 150 tons. The process is capable of being scaled upward to 300 tons at least.

Ladle Degassing—The third alternative is not particularly unusual. A ladle, filled with liquid metal and slag, is placed in the chamber, which is sealed and the pumps started. When pressure has been reduced to 30 mm of mercury, the slag surface begins to bubble violently. Boiling persists until the gas is removed or the vacuum broken.

The method is limited in the amount of gas it can remove. While useful, it will not degas the metal sufficiently for the highest quality of forging ingots.

Economy — BV claims it can pour ingots in vacuum as cheaply as in air. The reasons: Greater yield of usable metal and a virtual guarantee of a sound ingot.

Stainless ingots of 40 to 50 tons have been poured with excellent results. Silicon transformer steels benefit greatly from vacuum pouring, the company says. The biggest ingots poured have been for turbine rotor forgings.

Coming Over — Entry of the process into American production was speeded last month by the announcement that National Research Corp., Cambridge, Mass., had acquired licensing rights. It will design, construct and install equipment and train operators.

National Research Corp. entered the picture originally through its German affiliate, Leybold-Hochvakuum-Anlagen G.m.b.H. of Cologne, which assisted Bochumer Verein in the design and construction of its vacuum equipment. The equipment presents no great technological problems, so National Research thinks the first American unit could be in operation by March, next year.

Every Feature Worth a Close, Close Look!

You're Right There! No stretch, no reach, no awkward lifting. Lathe has clean, close front with spindle right under hands.

Why Fight Chips? Bedway design provides chutes to empty chips into open pan at rear of lathe. Simple, practical, time-saving.

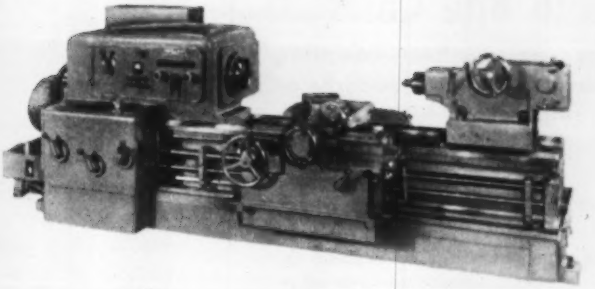
Headstock With a Brain! Dial work diameter setting and surface cutting speed setting. Dyna-Shift headstock *automatically calculates* required spindle speed and shifts to it hydraulically. No mental gymnastics — no compromise speeds!

Two for One. When turning medium steel, 1 cubic inch of metal removal per motor horsepower has been considered good performance. On the Series 80 you can raise that to over 2 cubic inches per motor horsepower.

Support Without a Thought. On longer bed lathes, the leadscrew feed and control rods are continually supported by traveling carriers that are automatically picked up and dropped off by apron movement.

Infinitely Variable — Infinitely Effective. *Variable speed* four-way hydraulic rapid traverse of carriage and cross slide brings tool to work at the rate of travel you choose—does away with final manual positioning.

The Monarch Series 80 DYNA-SHIFT . . . The New Look in Heavy-Duty Lathes



MONARCH SERIES 80 DYNA-SHIFT LATHE, 36 Spindle Speeds. Headstock Ratio—125 to 1.

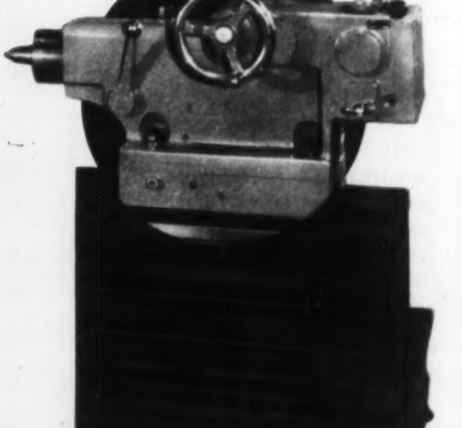
Models 1600 and 1601. Clearance diameter 26″ and 30″. Swing over cross slide 16″ and 20″. Speed Range 10-1250 RPM.

Models 2000 and 2001. Clearance diameter 32″ and 36″. Swing over cross slide 20″ and 24″. Speed range 8-1000 RPM.

Here's the lathe that's the talk of the shop and front office alike! The new Monarch Series 80 Dyna-Shift provides a completely new approach to the problem of heavy-duty metal turning—and the results are a rate of metal removal beyond the reach of previous designs; plus added production caused by the many exclusive, new built-in conveniences.

A look at just the few features pictured here tells why. Every one adds to the increased productivity and ease of operation of the machine. And there are so many more that we've prepared a complete, illustrated booklet to tell you about them. For full information on the lathe that gives you ultimate proficiency in the use of carbide tooling on work of considerable size—send for our Booklet #1602 . . . . **The Monarch Machine Tool Company, Sidney, Ohio.**

Nimble Tailstock. Two speed range spindle movement—*power positioning* provided by engaging plunger on carriage and using longitudinal power rapid traverse.



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Sidney, Ohio

Please send me your illustrated booklet #1602 describing the Series 80 Dyna-Shift Lathe.

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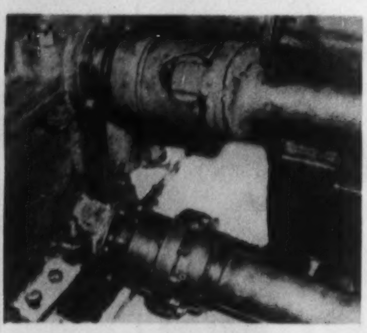
Teeth Bite Costs

Gear-type flexible coupling solves maintenance headache on hot strip coiler

A TRADITIONAL PROBLEM in steel mill maintenance has been solved at U. S. Steel's Irvin Works. The company is using flexible gear-type couplings to replace the old universal or slipper-type couplings on their hot coiler pinch rolls. Other than lubrication, no maintenance has been required for a year and a half.

This mill produces 2700 tons of hot strip every 8 hours. Strip up to ¼-in. thick and 73 in. wide is handled at 2000 fpm. Such production produces a tremendous wear problem.

Old Story—Weekly maintenance expense of the old-style couplings was high. Four brass slippers per shaft per week amounted to a total of 483 replacements in a year, plus 8 hours for rewelding the spindle tongue every two weeks and 16 hours every three months for machining the slipper seat.



DRIVE COUPLINGS
. . . universal (top), gear-type (bottom)

Adaptable — The flexible, gear-type coupling has been improved by fully crowned teeth patented by American Flexible Coupling. While carrying a full load, this gear shape produces a uniform wear pattern which contributes to higher shock loading and improved torque, regardless of operating angles.

This coupling can be used in many heavy operations. It can be adapted to special-purpose rolling operations in ferrous and nonferrous blooming, strip, rod, sheet and structural rolling mills.

MACHINE TOPICS

By R. F. HUBER, Machine Tool Editor

LOOK FOR some hasty explanations and maybe a change in policy on armed service procurement of capital equipment.

The way it stands contracts can be let to a foreign bidder if there is a 6 per cent price differential. This takes care of most contracts. One industry estimate is that good European machine tools could be delivered to the U. S. about 25 per cent below domestic prices, even after the 15 per cent tariff. Labor rates account for the difference. Skilled mechanics cost $2.20 an hour here, 70 cents in Germany and 45 cents in Belgium and The Netherlands.

Tilted Scales — Another factor stimulates foreign buying. In a letter to Arthur S. Flemming, director of defense mobilization, Everett M. Hicks said regulations "permit the rejection of U. S. bids in the field, despite a claim that the national security would be adversely affected. They provide that cases shall be referred to Washington only when the decision in the field is to 'buy American,' and not when it is to 'buy foreign.' "

Mr. Hicks, chairman of the Government Relations Committee, National Machine Tool Builders' Association, continues: "This procedure weights the scales heavily in favor of foreign bidders. When a contracting officer knows that his decision will be reviewed in Washington if he 'buys American,' he is likely to 'buy foreign!' "

Cumulative—The danger is that both factors tend to encourage purchase of foreign equipment. This despite the Vance plan and other recommendations that maintenance of a "healthy" American machine tool industry is essential to preparedness. The industry, in fact, is operating below levels considered healthy by the Vance plan.

Half and Half — There's little chance that the 6-per-cent price differential will be changed. But there is a chance that Washington will make different plans for reviewing decisions of contracting officers.

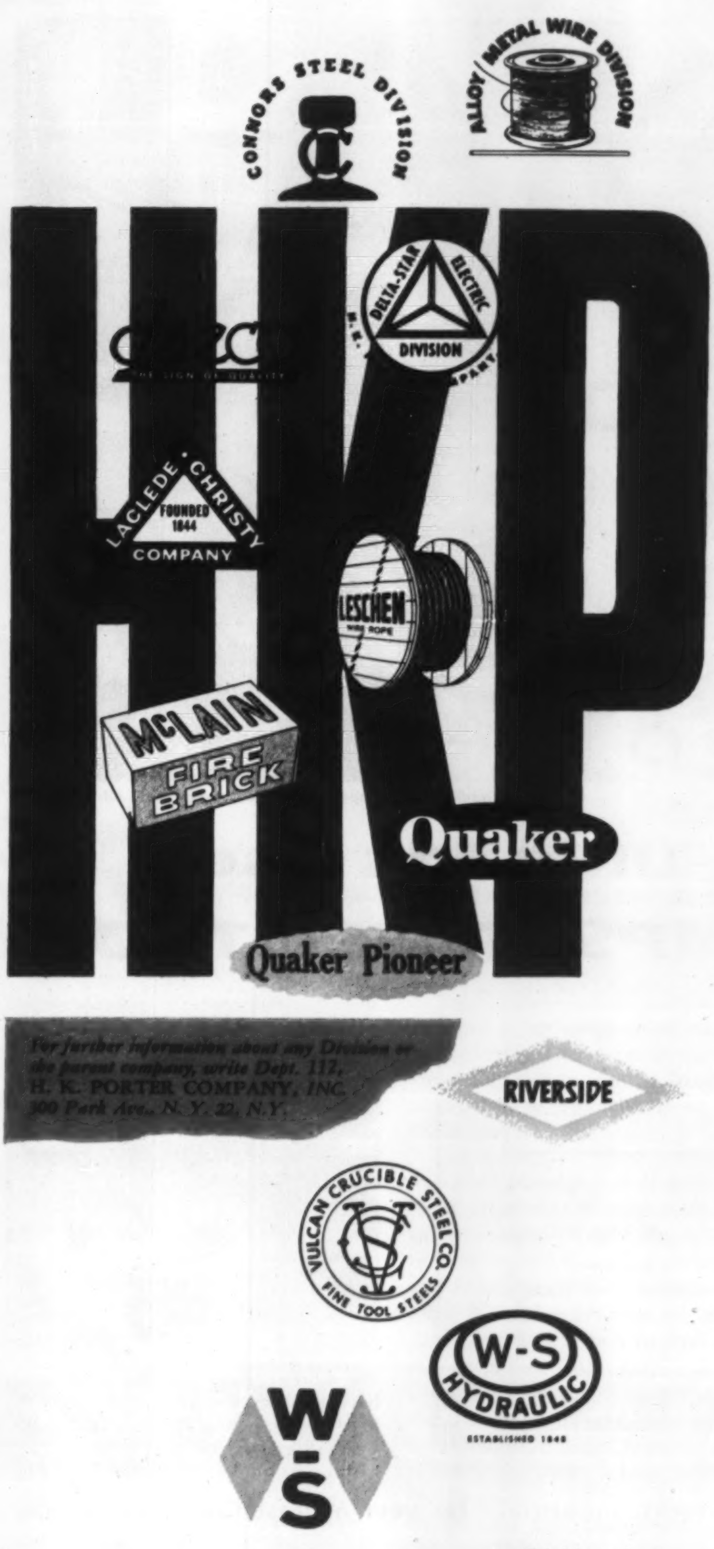
Mr. Flemming told STEEL he had appointed a task force to investigate the "total picture" with respect to machine tools, particularly huge, long-lead-time machines.

This committee has not reported. When it does, the Washington - review policy should be taken up.

Explaining the government's point of view, Mr. Flemming said Washington wants to be consulted in those decisions that reflect something essential to national security interests. If the contracting officer feels national security interests are involved, he buys American. These are the cases reviewed in Washington.

With no review on the "buy foreign" decisions, contracting officers feel freer going ahead on them than they do with a "buy American" contract because of the Washington brass involved.

One of the basic problems is that contracting officers often aren't convinced that their single decision has any effect on machine tool capacity. They forget the cumulative effect.



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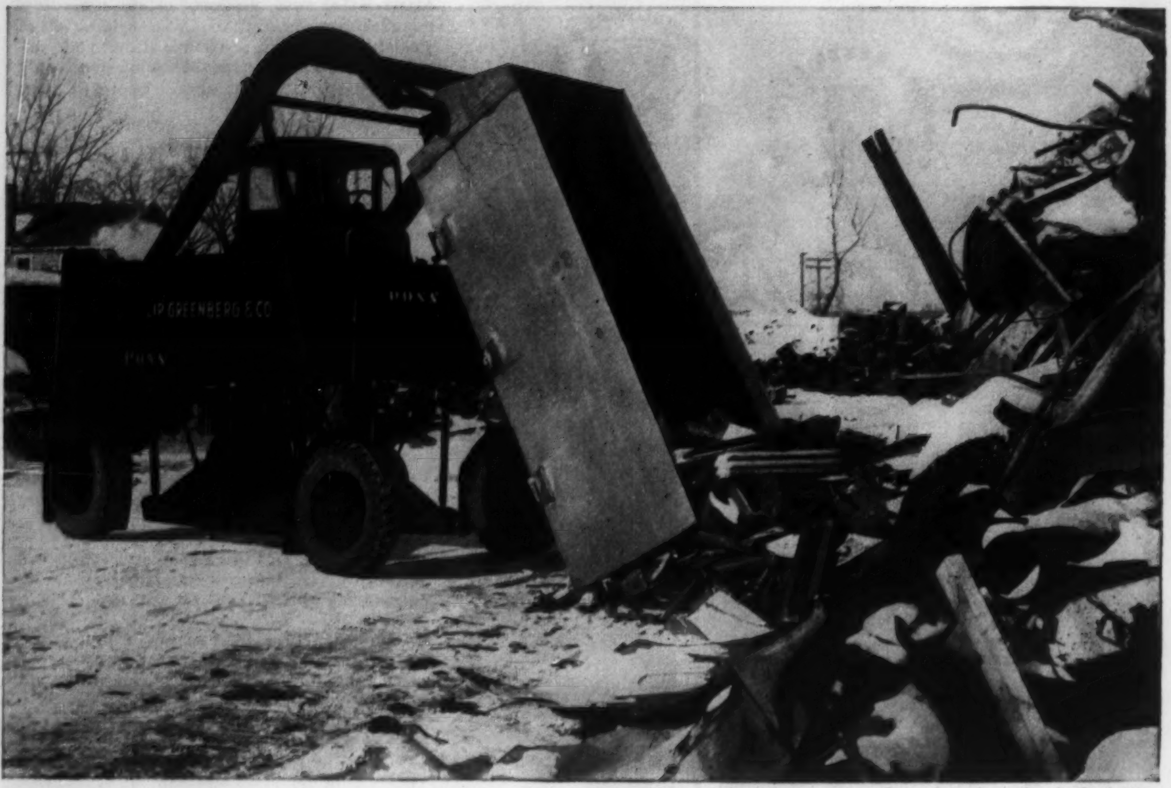

"Straddle Dump" in operation, Philip Greenberg Co., St. Paul, Minn.

loads itself—unloads itself
NOW . . . DUMPS ITSELF TOO

Here's the hottest development in the waste trade industry
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It's too good to pass up. Call your local Clark-Ross dealer right now. Get the full details on how the new Carrier "Straddle Dump" will speed your operations—save you money.

The Carrier gives over-the-road scrap hauling at truck speeds, self-dumps the load at destination. Here's a real profit-building system for your yard.

Look in the Yellow Pages under "Trucks, Industrial" for your nearest Clark-Ross Dealer.

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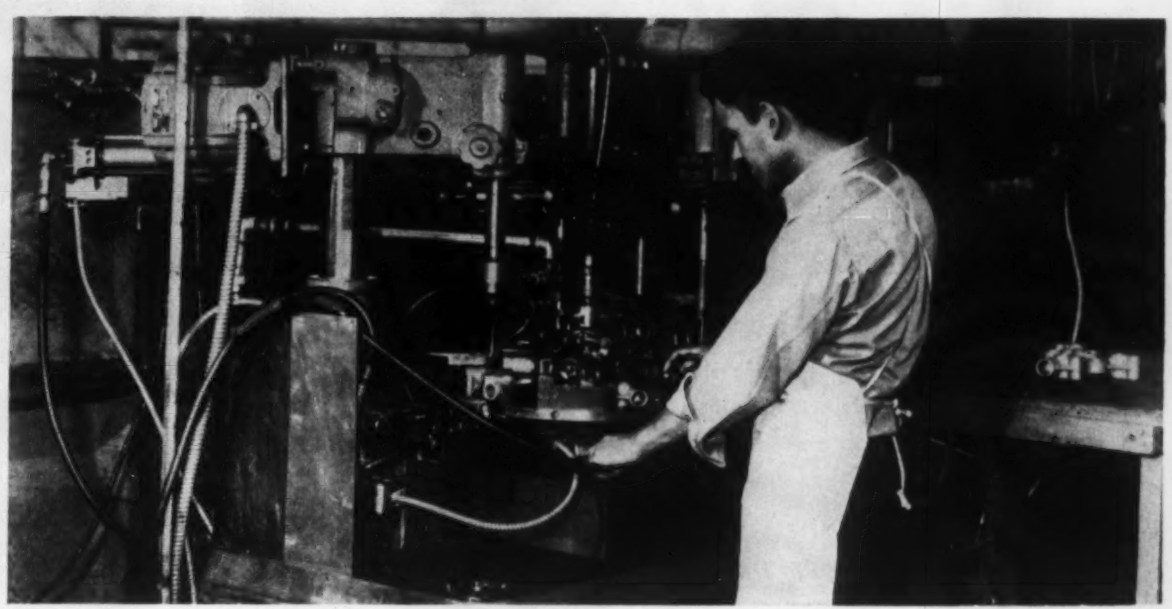


Compressed Air & Gas Institute

Used for power feed and clamping on this and other machines . . .

Air Speeds Diversified Production

VERSATILITY, a key advantage of compressed air power, has a special meaning for the manufacturer who must keep his production fluid.

At Weber Aircraft Corp., Burbank, Calif., 85 per cent of all portable tools—extensively used in its operation—are air operated. The company makes interior equipment for commercial and military airplanes and is a subcontractor for airframe components.

Planning — Before going into production on a contract, careful study is made of the work to be done, the type of tool to be used at each step, the revolutions per minute (of portable tools) and other considerations.

Reaming, drilling and burring operations are speeded up by having several tools on hand to handle the different speeds needed. Quick-change air hose couplers make for simplicity. All tools are serviced every three weeks, regardless of how much they are used.

Special Tools — Weber Aircraft uses compressed air power to solve special production problems. One example is a turret-head drilling machine used on castings (see photo). Air cylinders clamp the work at each of the machine's six stations. Four air cylinders feed and return the drills.

Four six-gang drill presses, with controlled air power feed and air clamping, are used on small work. One man loads and unloads. A similar type feed is used on a table saw.

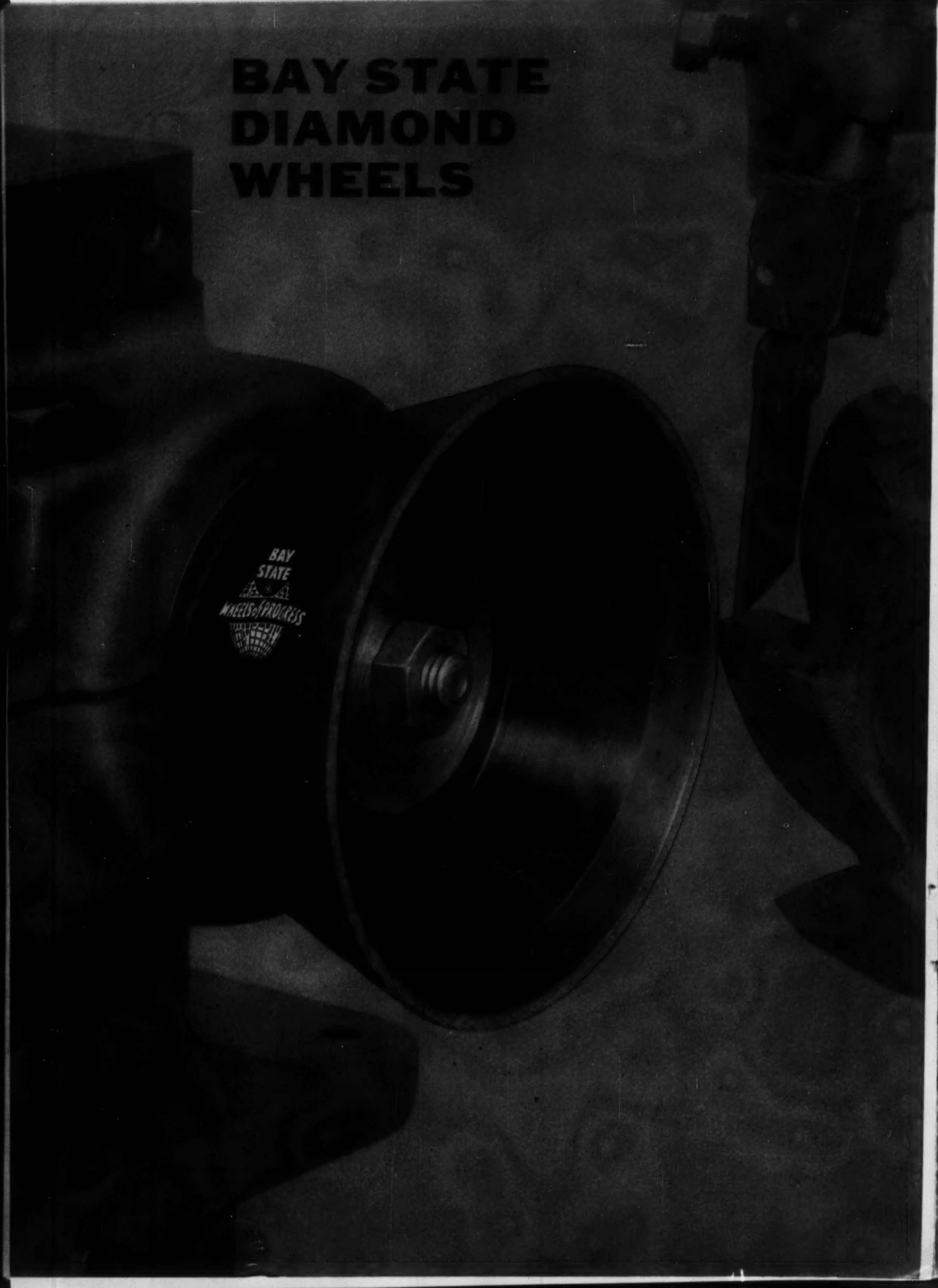
For Safety—Worker safety gets an assist from compressed air. The hoist used around the red lead dip tank is operated by a spark-free, air motor; foot bars for tripping power on the sheet metal shear have been replaced by air cylinders; punch presses are two-hand air actuating; air cylinders lock the 5-ton rope drop hammer until the pistons of the air cylinders are actuated to release dogs.

Spray painting and abrasive blasting are among the largest single uses for compressed air at the aircraft plant. Other uses: Heat treat furnace doors are opened and closed by air pistons on each side, acting on a chain and sprocket drive; the double arm of a router head is swung by air; rivet squeezers and other type riveters are air operated; liquids are agitated by air. Air also operates planishing hammers, nibblers, arbor presses, welding arms, and ejects light pieces from punch presses.

Important — The full benefits from compressed air, however, cannot be obtained without ample air compressor capacity and a distribution system which delivers the power where wanted. Weber Aircraft has two centrally located air compressors driven by 150-hp motors. They are alternately operated.

In addition, there are two portable air compressors, used for plant maintenance. When a small crew of night workers is on, one of the portables is used rather than one of the big stationary units.

Air lines from the central compressor plant reach to every open and enclosed working area of the 10-acre plant. A system with a pattern of closely spaced outlets is part of the over-all planning for flexibility.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Workman tightens one of the 12 large, socket-head cap screws on a 30-hp centrifugal casting machine

High-Tensile Bolts Take the Strain

BOLTS on centrifugal casting machines presented a choice of evils at Lebanon Steel Foundry, Lebanon, Pa.

The carbon steel bolts hold the mold to the back plate of the machine. Tighten them too much and the threads would strip.

Tighten them too little and molten metal would seep between the mold and the back plate, forming a flange which prevented normal contraction during cooling. Surface cracks appeared, which caused casting rejections.

Solution—The company solved the problem by replacing the carbon-steel bolts with Unbrako giant cap screws made by Standard Pressed Steel Co., Jenkintown, Pa. They can be tightened to 1500 ft-lb—ample torque to give a liquid-tight fit—without damaging the threads.

The cap screws, 1½-in. in diameter and 7 in. long, are upset forged from heat-treated alloy steel and have a rated tensile strength of 225,000 lb per cap screw.

Thread Breakage—But still another problem faced the foundry. When removing bolts to change molds in the casting machines, the threads would often gall and break. Bolts were being removed after the machines had cooled down completely and the difference in contraction between the back plate and the bolts caused the bolts to freeze.

The problem was solved by loosening the bolts when the machines had cooled to 500° F and removing them when cooling was completed.

Stress Causes—The stresses imposed on the centrifugal casting machines originate from both thermal and mechanical causes.

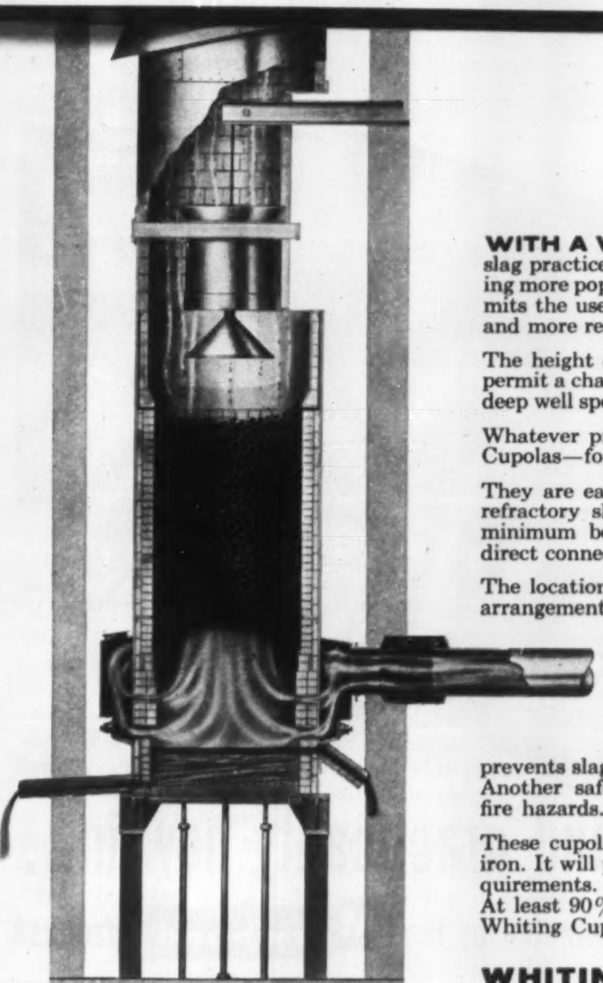
Take the pressure of the molten metal against the back plate. The machines are charged with up to ¾-ton of molten metal and are operated at speeds up to 1000 rpm. The centrifugal pressure of the metal tends to pull the back plate away from the mold, exerting great strain on the bolt threads and head.

Temperature Changes—Another source of strain is the wide range of temperature to which the casting machines are subjected. Molten high-alloy steel is poured into the machines at 2900° F and is spun for about 10 minutes. By that time it has solidified but is still red hot.

Lebanon compensates for unequal expansion in the machine parts by preheating the mold, back plate and bolts to 300° F with a gas torch.

Weight—Still another cause of stress is the weight of mold, front plate and molten metal—amounting to as much as 4 tons with a 1400-lb pour. This is a shear stress on the bolts, and while it is easily within the shear strength limits of bolts of this size, it creates a warping effect between the mold and the back plate, making it necessary to use considerable torque on the bolts to get a tight fit between back plate and mold.

Lebanon casts rings 20 to 43 in. in diameter, 5 to 12 in. wide and 4 to 5 in. in wall thickness—from carbon, low-carbon and high-alloy steel—using five 30 and one 25-hp centrifugal casting machines. The castings are for such applications as engine mounts, spacer rings and turbine housings.



WITH A WHITING CUPOLA you can use *either* basic or acid slag practice! Basic slag practice, while still somewhat new is becoming more popular because it makes possible a reduction in sulphur, permits the use of a greater percentage of steel scrap with less pig iron and more readily increases the carbon content of the metal.

The height of the tuyeres in the Whiting Cupola may be varied to permit a change from acid to basic slag operation or vice versa. Special deep well spouts are available for use with the basic slag practice.

Whatever practice you intend to use, be sure to look into Whiting Cupolas—for they are built for a lifetime of efficient service.

They are easy to erect and the design permits the use of standard refractory shapes from top to bottom. Piping costs are held to a minimum because the tangential blast entrance allows the most direct connection from blower to windbox.

The location of windbox above the tuyeres allows for easy light-up arrangements. Air for melting is distributed evenly with minimum resistance—with no air leakage in windbox. Lining and stack are protected against moisture by stack joints that open downward.

A fusible safety plug is provided with a special safety tuyere. If the cupola tender does not tap quickly enough, the metal and slag flow through a channel which prevents slag from entering other tuyeres and will warn the operator. Another safety feature is a double-cone spark arrester to reduce fire hazards.

These cupola principles result in economy and high quality molten iron. It will pay you to call in a Whiting Engineer to discuss your requirements. He has the *experience* to help you plan your installation. At least 90% of the cast iron that is melted in cupolas is melted in Whiting Cupolas! Write or phone for his counsel now!

WHITING CORPORATION

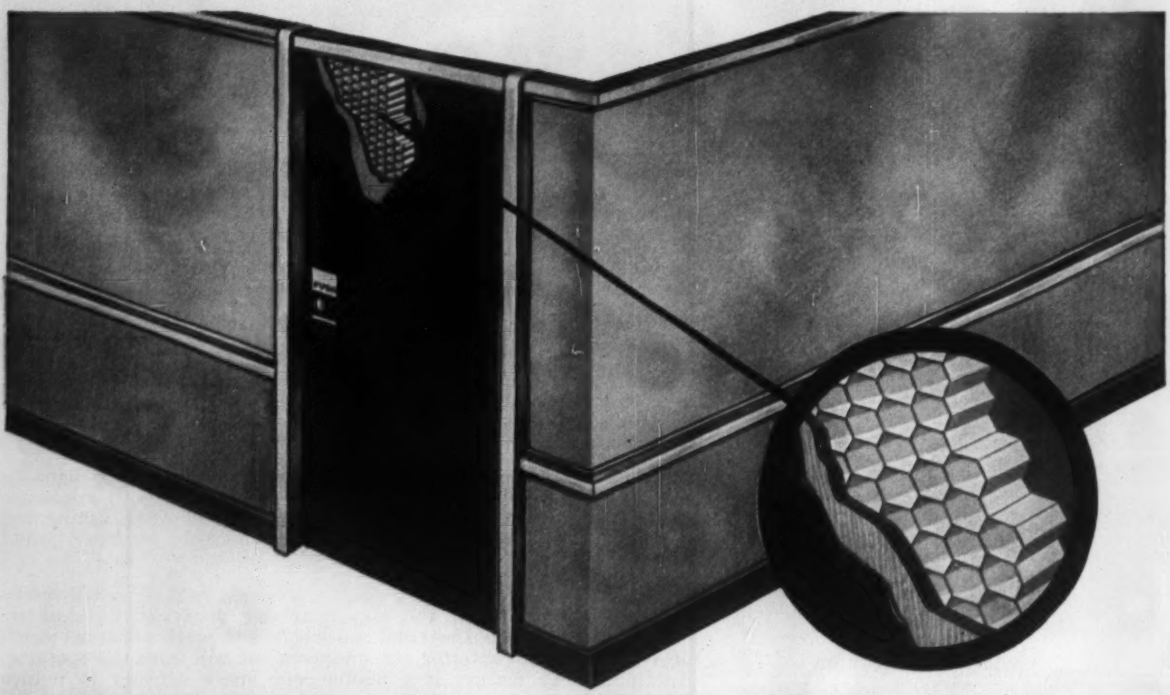
15643 Lathrop Avenue, Harvey, Illinois

NOW! USE BASIC OR ACID SLAG PRACTICE!

Send for Whiting Bulletin FY-172 entitled "Whiting Cupolas." 24-pages packed with illustrations and information about the Cupola, Tuyere Design, Cupola Accessories, Whiting Hot Blast and complete statistics. Write today!

FOUNDRY EQUIPMENT MEMBER FEMA MANUFACTURERS ASSOCIATION INC.

WHITING
CUPOLA



Marvinol vinyl's beauty and practicality now in...

the honeycombed Kawneer door vinyl-laminated by the Marvibond process

Your doors are usually the visual focal point of inquiring visitors, and at the same time, the gateways through which they must pass—opening and closing, pushing and pulling. Because of this, Kawneer* now adds the beauty and practicality of Marvinol® vinyl to its functional triple-strength door. The vinyl is permanently bonded to the metal by the MARVIBOND† process, Naugatuck's exclusive technique for laminating vinyl to most metals.

Marvibonded metals offer the full, rich colors of vinyl in practically any surface effect—smooth or matte finishes, leather-like grains, marble patterns, prints, weaves, or other embossed finishes. And the Marvibond process adds to the strength, rigidity, and formability of metal, the abrasion resistance, chemical resistance, and weather resistance of vinyl... Marvinol vinyl which will not chip, scratch, or peel... nor support combustion. And, scuff-marks, fingerprints, and stains wipe off with a damp cloth.

Marvibonded metals are now being produced on a continuous production basis. Laminated before forming, they can be fabricated by all standard metal working tools—even deepdrawn without fracture or loss of adhesive bond.

If you are using sheet metals that have to be finished, or that would have added sales value if they were, why not investigate what Marvibond has to offer? **For samples, technical data, and the location of licensed laminators, please write to us on your company letterhead.**

†Patent applied for

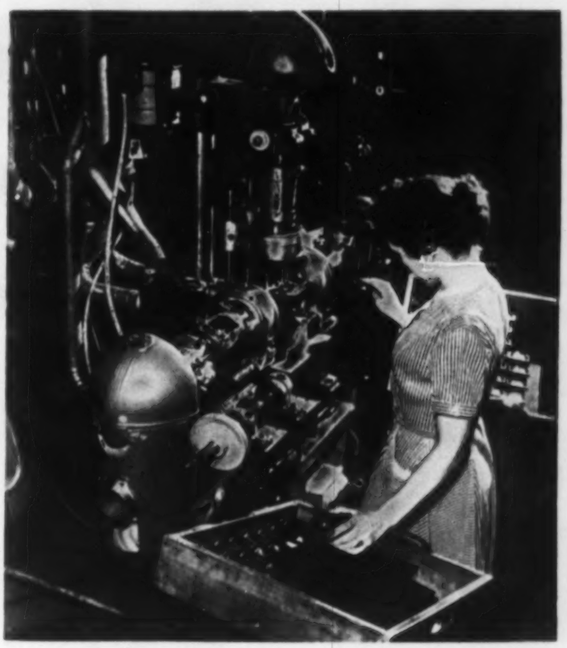
*Kawneer Company, Architectural Products Division, Niles, Michigan

Naugatuck Chemical

Division of United States Rubber Company
Naugatuck, Connecticut

BRANCHES: Akron • Boston • Gastonia, N.C. • Chicago • Los Angeles • Memphis • New York • Philadelphia • IN CANADA: Naugatuck Chemicals, Elmira, Ontario
Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • Cable Address: Rubexport, N. Y.

Home-Made Tools Click for Camera Maker



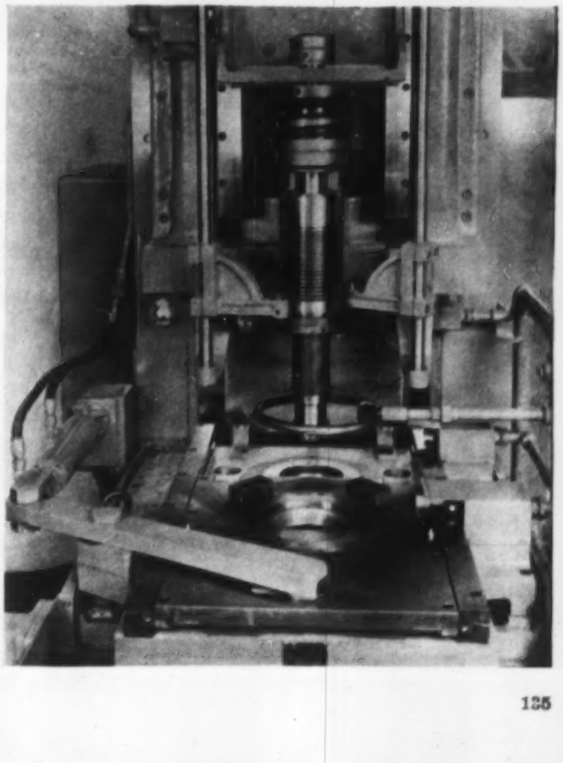
PRECISION MACHINING of camera bodies and a flash attachment posed a problem at Whitehouse Products Inc., Brooklyn, N. Y. Production requirements were sufficiently large to rule out single drilling of the complex components, but not enough to warrant investment in special machine tools.

Whitehouse technicians designed and built their own production tools. Nine 14-in. Delta drill press heads were arranged in a multiple unit to be operated individually or collectively.

Production—Machining the flash attachment (see photo) calls for three drill heads to drill eight holes and perform a deburring operation simultaneously. Two opposed horizontal heads, equipped with three spindles each, drill electrical contact and hinge holes on the sides of the unit. A vertical, two-spindle head drills two holes through the flash attachment fastener while it deburrs a 1¼-in. reflector hole in the flash housing. Production rate is 600 parts an hour.

In machining the camera bodies, one unit of four heads drills 16 holes at the rate of 300 pieces an hour. The other unit, used for operations on the camera's back cover, consists of two heads that drill five holes. Production rate for this sequence is 450 parts an hour.

Loading Setup Boosts Broaching Output



OFTEN it is possible to adapt a standard broaching machine for high production rates without the extensive modifications a complete change-over to automatic production would require.

Engineers at Colonial Broach & Machine Co., Detroit, boosted production to 300 parts an hour by adding a simple loading and unloading device to a standard 15-ton, 24-in. stroke, pull-down machine. The job is broaching inside diameters of automobile differential ring gear blanks for accurate locating in the gear cutting operation that follows.

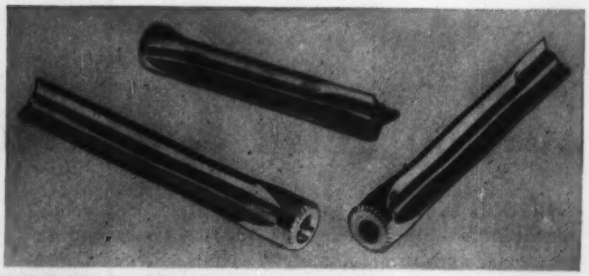
Operation—The hydraulic, shuttle-type loading fixture is mounted on the work-holding platen. No auxiliary part-holding clamps are necessary; the fixture only locates the part with respect to the broach. Machine and fixture cycle are hydraulically and electrically interlocked for automatic operation.

Operating cycle: 1. Part is loaded with fixture in retracted position. 2. Cycle is energized and loaded fixture moves into broaching position. 3. Broach starts down stroke, work-stroke puller engages, automatic return puller disengages and cutting stroke is made. 4. Fixture is shuttled into unloading and loading positions as broach returns.

The entire cycle, including manual loading and unloading, takes only 12 seconds.

WIDE ENDURO BELT
...keeps scratches
off bandages

CORROSION RESISTANCE IN TUBULAR FORM. Republic's Steel and Tubes Division turns out miles of ENDURO Stainless Steel Tubing for the process industries and for mechanical applications. Republic ELECTRUNITE Stainless Steel Tubing and Pipe offer the identical high mechanical and corrosion-resisting properties demonstrated in sheet form by the Reynolon belt. Call Steel and Tubes for application assistance on all your fluid handling and tubing problems.



WHAT'S EVEN MORE CORROSION-RESISTANT? REPUBLIC TITANIUM. Titanium surpasses even stainless steel in resistance to many severe forms of corrosion. Yet, it weighs only 56% as much as alloy steel. Here, Republic Titanium supplies corrosion-resistance and lighter weight to parts designed to knit human bones. Republic Titanium and Titanium alloys now are available for civilian applications. Republic has the experience to help you use them best. Write us.

REPUBLIC
STEEL

REPUBLIC STEEL CORPORATION
3120 East 45th Street,
Cleveland 27, Ohio

I'm interested in additional information on:

☐ Republic ENDURO® Stainless Steel
☐ Stainless Metallurgical Assistance
☐ ELECTRUNITE® Stainless Steel Tubing
☐ Republic Titanium
☐ Republic Steel Drums and Barrels

Name________________ Title____________
Company________________________________
Address________________________________
City____________ Zone____ State__________
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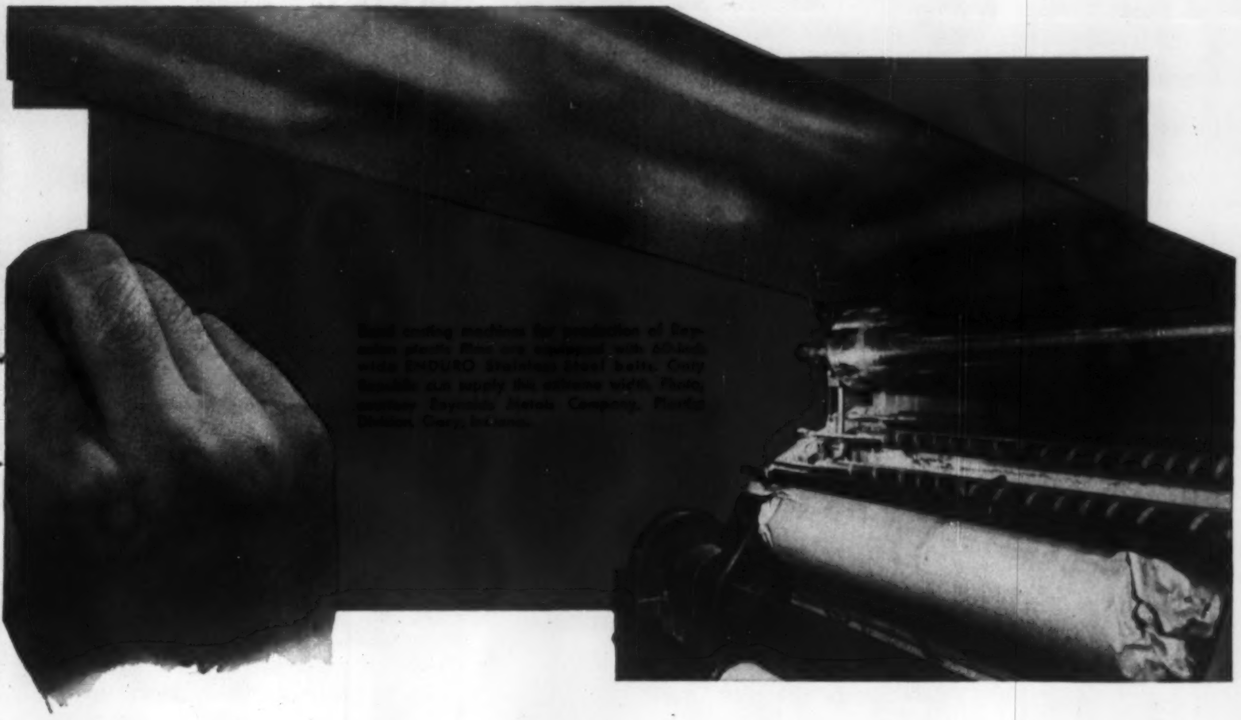
NO CONTAMINATION—NO SPOILAGE. Republic Steel offers a full range of barrels, drums and pails in a variety of metals and finishes to protect your chemical, food and other products. Choose from ENDURO Stainless Steel, hot dipped galvanized steel, hot dipped tinned steel, mill galvanized sheet steel, hot rolled open hearth steel, plain or lacquer lined. Choice of gages to meet all handling and shipping requirements. Many styles in sizes up to 55 gallons. Contact Republic.



Band coating machines for production of Reynolon plastic films are equipped with 60-inch wide ENDURO Stainless Steel belts. Only Republic can supply this extreme width. Photo, courtesy Reynolds Metals Company, Plastics Division, Gary, Indiana.

This wide, polished ENDURO Stainless Steel belt carries Reynolon plastic coatings in process. One such type makes the peel-off backing for those handy packaged small bandages you use.

The ENDURO surface provides a high luster finish! Since the slightest scratch would be "mirrored" or duplicated in the finished product, the quality of the stainless steel surface determines the quality of the plastic coating. Here, ENDURO keeps scratches off bandages!

Note that the belt is supported only by top rollers. That allows both sides to carry the plastic material . . . speeds production. It also means that the belt must have great tensile strength. ENDURO supplies that strength. In this case, tension on the belt runs as high as 90 tons.

What's more, this belt must be heat-resistant. In process, material passes through 600° ovens. And, many of the plastics processed are in hydrous or acidic solutions. So, the belt must resist rust and corrosion. ENDURO does just that.

Four of these sixty-inch wide belts help produce Reynolon plastic film. Even at this extreme width, the belts must stay flat. "Crowned" metal could snap like an oil can and damage the plastic.

Republic metallurgists worked closely with Reynolds Metals Company, Plastics Division, to develop this unusual equipment. If you have process or product problems involving heat, corrosion, surface finish or strength, ENDURO Stainless Steel quite likely is your answer. Republic metallurgists will help you apply it most profitably. Write Republic.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

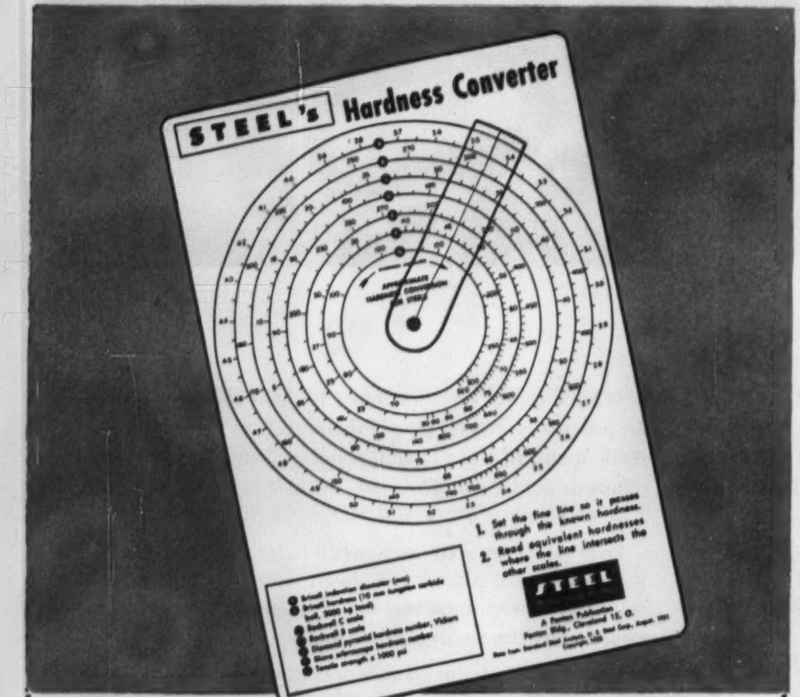
Boron Eases Carbide Brazing

A practical production method has been developed for brazing cemented chromium carbide with silver alloy filler metals. It is based on the use of a brazing flux containing powdered boron, which, being a strong reducing agent, appears to have the ability to dissolve the tough chromium oxide film.

Best results have been obtained with a combination of the boron-containing flux and filler metal (57 per cent Ag, 33 Cu, 7 Sn and 3 Mn). The new technique could pave the way to wider use of cemented chromium carbide for applications in the 600° F range.

Such uses include valve components, extrusion nozzles, gage blocks, high-speed instrument bearings and similar applications where good corrosion, abrasion and oxidation resistance is essential.

The new method was developed by Carboloy Department of General Electric Co. and Handy & Harman, maker of brazing metals and fluxes.


STEEL's Hardness Converter
1. Set the fine line so it passes through the known hardness.
2. Read equivalent hardnesses where the line intersects the other scales.
STEEL

STEEL HARDNESS CONVERTER

Here's a handy tool that can save you hours of valuable time.

Makes it possible for you to convert any known steel hardness in a matter of seconds.

(1) Set the fine line on the plastic rider so that it passes through the known hardness.

(2) Read equivalent hardness where the line intersects the other scales.

That's all there is to it!

STEEL Hardness Converter is available to you at these prices:

1 — 4	$ .40 each
5 — 14	.35
15 — 29	.32
30 — 49	.28
50 or more	.25

(Please send check with order)

Order yours today from:
Editorial Service
STEEL
Penton Bldg.,
Cleveland 13, O.

TV Helps Inspection

Scraper blade edges are magnified by a microscope and the image flashed on a TV screen

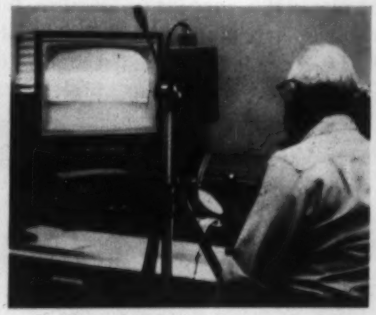
EYE STRAIN is an old enemy of good inspectors. The glare of bright lights on small, shiny parts has started many a headache.

A TV camera now gets the headache. Inspectors at the American Can Co. who examine chrome-plated scraper blades for sharpness no longer squint through a microscope for long hours. The camera does it for them and shows what it sees on a TV screen.

Magnifies — Scraper blades are used in the lithographic coating machines that label cans. The blades must be sharp, otherwise splotches and lines spoil the labels and efficiency decreases rapidly. The microscope magnifies the sharp edge of the blade 288 times for the TV camera, which picks up the image and sends it to a screen nearby.

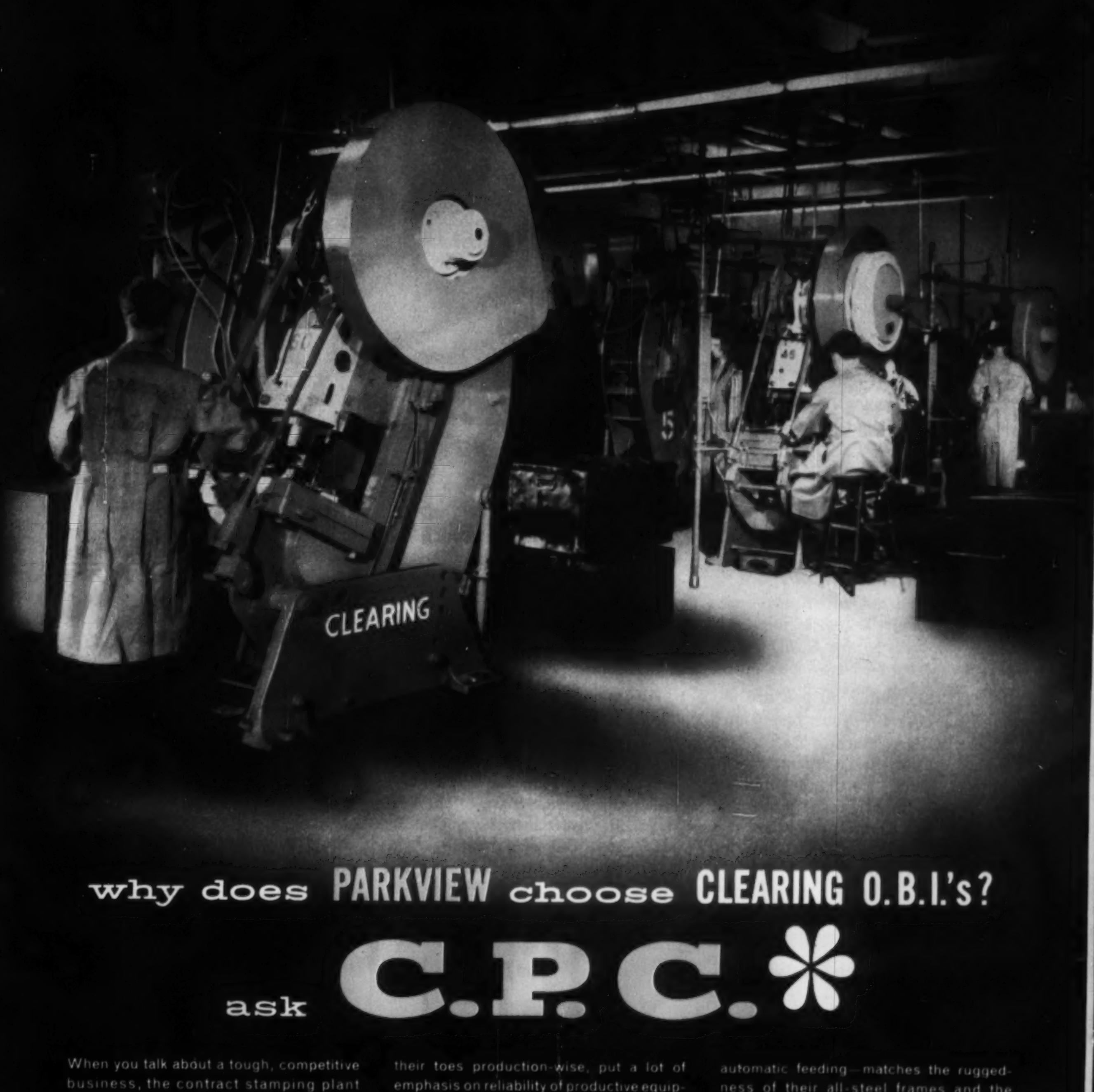
Savings — The inspection foreman has found that inspectors get the job done twice as fast and make far fewer mistakes. To inspect the blade the inspector moves it slowly through a holder under the microscope. The receiving set reproduces the image as a horizontal bar about 4 in. wide.

Limits — This system has the same advantage as a comparator in defining limits and tolerances. Two fine lines are shown simultaneously with the blade image and indicate the limits.



This microscope-TV-camera combination takes care of the hard, eye straining job of inspecting the sharp edges of scraper blades. The camera shows what it sees as a 4-in. bar on a standard TV screen.

INDUSTRY GEARS FOR HIGHER PRODUCTIVE STANDARDS



why does PARKVIEW choose CLEARING O.B.I.'s?

ask C.P.C.*

When you talk about a tough, competitive business, the contract stamping plant stands out as a good example. Parkview Metal Products in Chicago is one of these. They manufacture all kinds of stampings, mainly for the electrical and electronic industries.

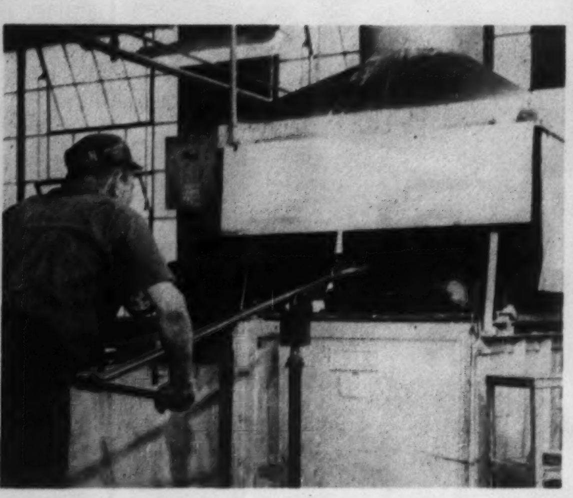
Companies like this, that have to stay on their toes production-wise, put a lot of emphasis on reliability of productive equipment. It's their bread and butter. Parkview has gone all out for Clearing O.B.I.'s because they can rely on them to meet their tight schedules. The versatility of their Clearings — the way they take extra-large dies and the way they can be adapted to automatic feeding — matches the ruggedness of their all-steel frames and the precision of their construction.

If you manufacture stampings, large or small, *Clearing Productivity Consultants can suggest ways to step up your production. Just call or write Clearing Machine Corporation. There'll be no obligation.

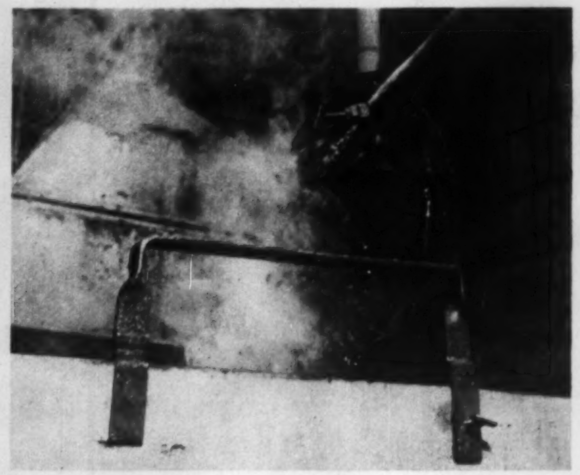
CLEARING PRESSES THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION *DIVISION OF* ***U. S. INDUSTRIES, INC.***

6499 WEST 65TH STREET, CHICAGO 38, ILLINOIS • HAMILTON PLANT, HAMILTON, OHIO



Springs and stampings to be hardened are heated to about 1450°F in a salt pot furnace



Flat springs at austenitizing temperature are dumped from the basket into a bath of oil. Quenching is fast

The Right Quench for the Job

By GARLAND WILCOX
Chief Metallurgist
Wallace Barnes Co.
Bristol, Conn.

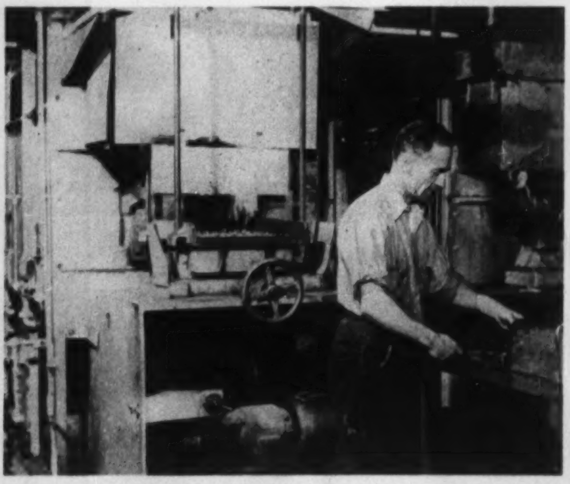
IS THE quenching oil you are using the best for your operation?

At Wallace Barnes Co., a division of Associated Spring Corp., Bristol, Conn., we didn't think we were. Laboratory tests proved us right. We found an oil with a quenching rate better than the one we were using.

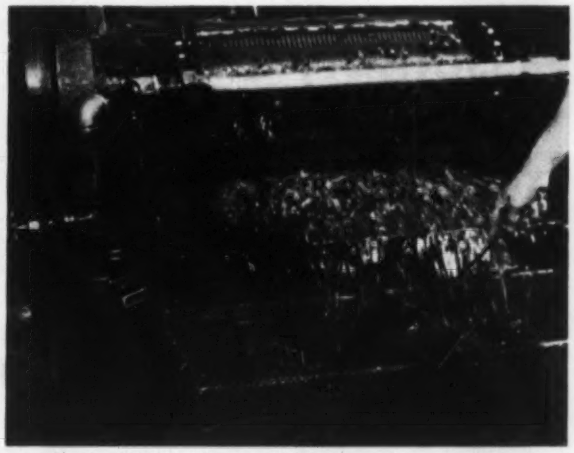
All-Important — Our company has been making springs for nearly a hundred years. Most of the flat springs are made of annealed SAE 1075 or 1095 steel. In hardening the finished part to the best physical properties, the quenching rate from the austenitizing temperature is all important. All our heat treating production is geared to the oil quench.

The oil we use must quench out the heaviest sections to a full martensitic structure. Only a 100 per cent martensitic structure after tempering has the high elastic limit a spring must have to keep from setting in service.

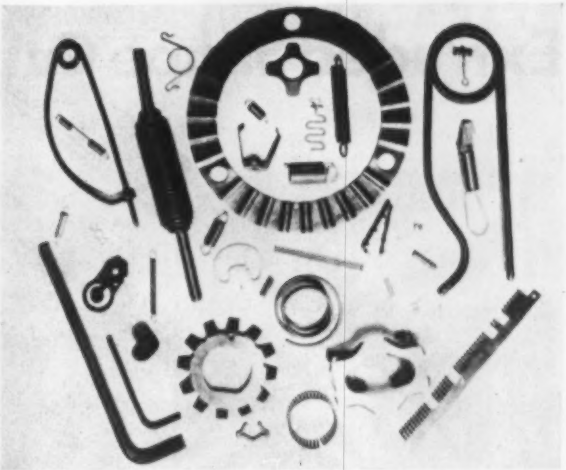
After cooling to temperature of oil (130°F), parts are rinsed in an alkaline degreaser



Shaker hearth furnaces speed production of many products. Here the operator gets ready to add another load



Parts coming out of shaker hearth furnaces are automatically dumped into oil. A traveling screen removes them and drops them into baskets to drain



Some of the products made at Wallace Barnes Co. Over 35,000 prints of production items are kept on file

The Test—We used a simple laboratory test to evaluate the quenching efficiency of sample oils. The test is designed to simulate production practice and is easily reproducible. Its results have worked out in production.

Samples of SAE 1095 are immersed in a lead bath at 1600°F. At 5-second intervals, from 5 to 60 seconds, they are removed from the lead and quenched in the test oil, which is mechanically agitated and held at 130°F. Samples then are vigorously agitated by hand throughout the quench, then tempered at 900°F. Specimens are prepared for microexamination and a Rockwell C hardness check.

Test Results — Several proprietary quenching oils were tested. Shell Voluta Oil 23 (Oil B) and another oil (Oil A) were selected as having quenching rates superior to the oil we were using. The accompanying graph represents the hardness of test specimens austenitized from 5 to 35 seconds at 1600°F, then quenched in three different oils and tempered.

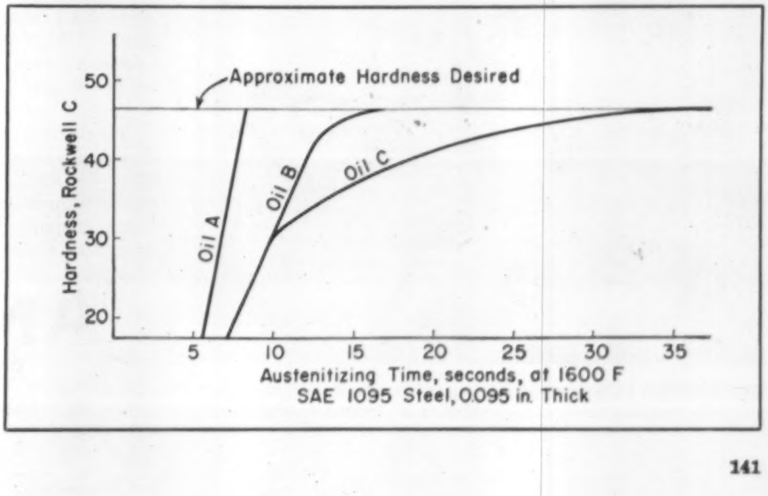
The Rockwell C hardness proved to be a less sensitive method of checking oil quenching power than microscopic examination. Oil A appears to have a higher quenching rate than Oil B. But on the basis of a microstructure free of transformation products (ferrite, pearlite or bainite), both oils were equivalent in quenching power. Oil C, the former production quenching oil, was inferior to either new oil.

Production Factors—Both Oil A and Oil B were tested in production. Here other performance factors came into play in hardening stampings of a variety of shapes and thicknesses. Production tests were carried out in a salt hardening line, austenitizing in chloride base salt, followed by oil quenching, washing in an alkaline solution and tempering in a nitrate salt.

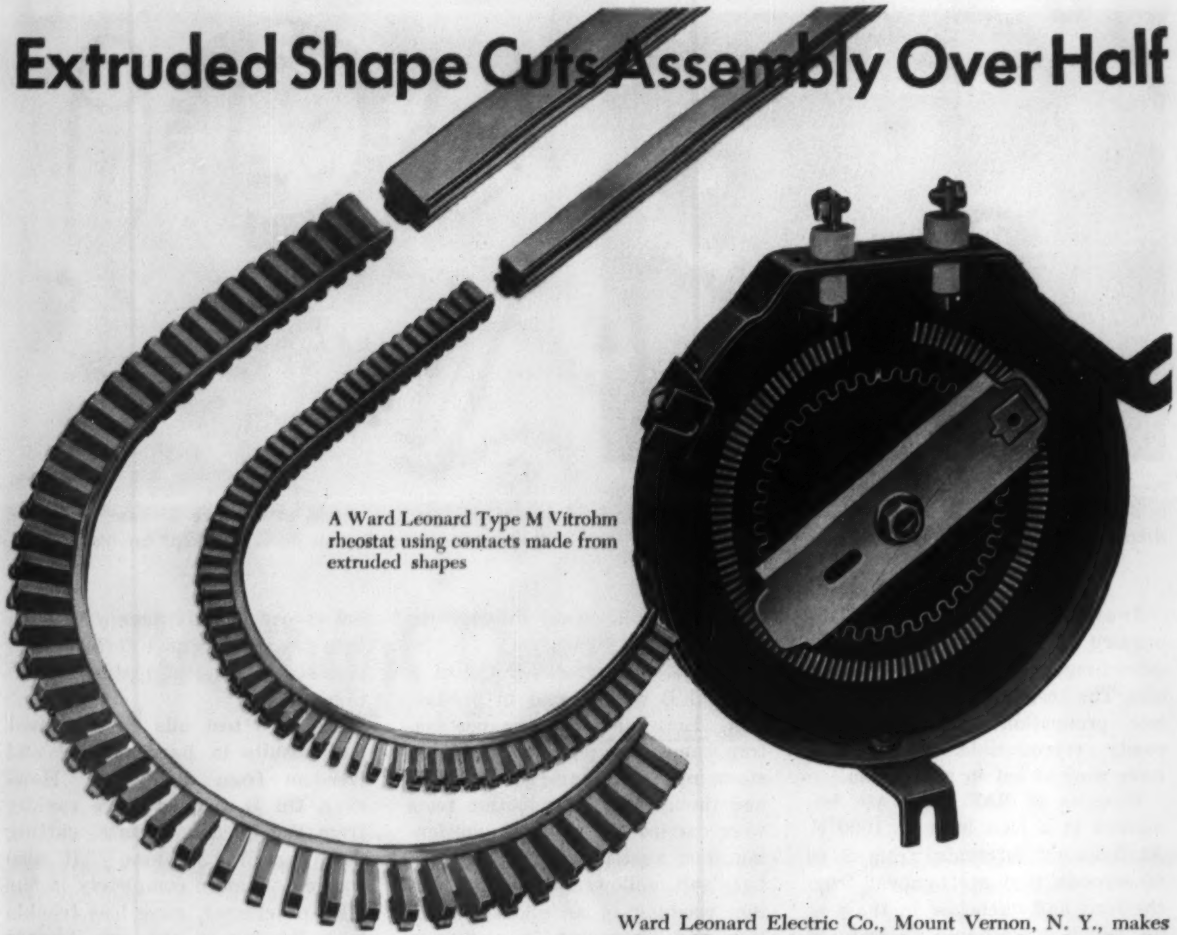
In production, the quenching oil must drain rapidly to minimize loss by dragout, and it should clean readily in the alkaline washer. If excess oil adheres to the parts, it carries over to the nitrate salt temper, where it flames off. If this carry-over is excessive, not only are working conditions bad, but the oil has a tendency to burn onto the parts and interfere with possible subsequent plating operations.

The two test oils gave equivalent results in hardenability and freedom from distortion. However, Oil B drained more rapidly from the quenched parts, cutting down on dragout loss. It also washed off more completely in the alkaline cleaner, gave less trouble with flaming in the salt temper and reduced oil baked to parts.

Production Results—Voluta 23 is in all our quench tanks of the spring hardening department, serving salt pot lines and shaker hearth furnaces. The foreman reports trouble with slack quenched parts almost has been eliminated; heavier stock goes through without special handling.

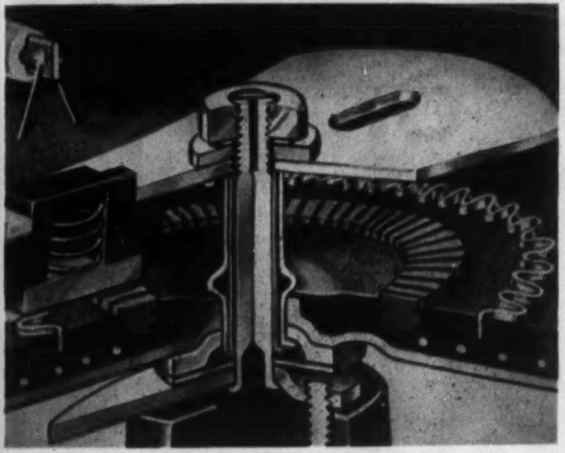


Extruded Shape Cuts Assembly Over Half



A Ward Leonard Type M Vitrohm rheostat using contacts made from extruded shapes

Ingenious application eliminates hand assembly, makes absolutely uniform stationary contacts in Ward Leonard power rheostats



CROSS SECTION VIEW of a Ward Leonard Vitrohm Type S rheostat showing how contacts are embedded in a vitreous enamel.

Ward Leonard Electric Co., Mount Vernon, N. Y., makes a line of high quality power rheostats marketed under the trade-name Vitrohm. Anywhere from 41 to 161 individual stationary contacts, or buttons, have to be embedded with their resistance elements in an insulating vitreous enamel—all contacts uniformly set and spaced, for uniform performance. Their patented process originally used buttons blanked out of sheet brass—hand assembled and spaced on a steel wire to hold them while the vitreous enamel was fired.

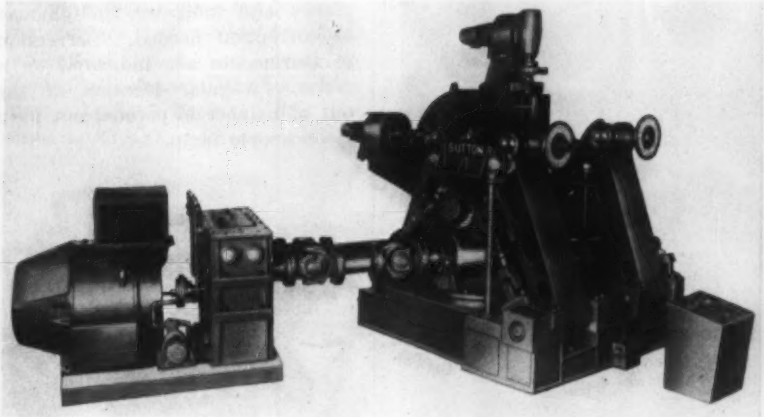
Ward Leonard refined the process and for four models now starts with the extruded shapes shown above. The stock is accurately slotted for correct spacing, forming a continuous line of buttons connected by a triangular "wire"—which is an integral part of the extruded shape. When sections are curved, the buttons remain uniformly spaced and oriented. After the button assemblies are embedded in the vitreous enamel, the connecting wire is easily milled off. Ward Leonard gets absolute uniformity with less effort and fewer rejects—it gets healthy dollar savings, despite the fact that more than half of the extruded shape is milled out.

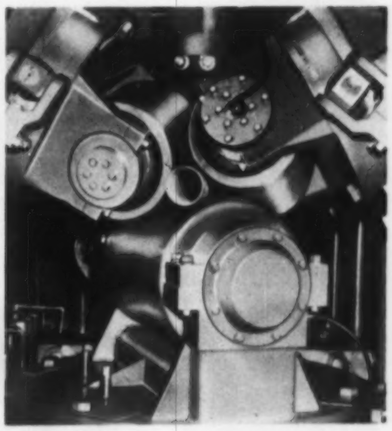
Imagination applied to extruded shapes can pay big dividends—lower direct labor costs—fewer machining operations—less scrap—improved product quality. Your Anaconda representative will be glad to work with you. The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 5594

ANACONDA®

EXTRUDED SHAPES

Short cuts to a finished product





Cluster Roll Arrangement Speeds Pipe Straightening

Upset tubing, casing and drill pipe are straightened 20 to 50 times faster on this seven-roll machine.

A large roll with two opposed idler rolls is at the entry end of the machine. An identical cluster is at the delivery end.

In the clusters, rolls are positioned at about 120 degrees to each other. Between the two clusters is an unopposed pressure roll. This arrangement confines the work to the pass line and gives a superior degree of end-to-end straightness.

Tolerances much more rigid than normal are easy to maintain. There is less scrap, threading operations are improved and the end product is of high quality.

Besides handling upset ends easily, the straighteners have many advantages in handling plain tubes and bars. For example, because the cluster rolls introduce a minimum amount of stress in a tube, loss in collapse value is greatly reduced.

The complete line includes models for different ranges of material sizes. All models are completely guideless, practically automatic in operation and can be changed over quickly for various sizes. *Write*: Sutton Engineering Co., First National Bank Bldg., Pittsburgh 22, Pa. *Phone*: Grant 1-8077

Turning Lathe Makes Cutting Tests

Here's a lathe that has the horsepower and rigidity to make practically any cutting test.

It has infinitely variable speeds from 625 to 3775 rpm. Special pick-off gears give even higher speeds.

The resistance of a metal to plastic deformation and the amount of energy converted to heat can be measured and the normal tool wear computed.

The lathe can be used to study special tools and tool geometry, for material control purposes and for research in new alloys, coolants and other materials. It is adaptable to a wide variety of test and research instrumentation.

Features include a 20-hp, variable-speed, main-drive motor and a mist-lubricated headstock. The tailstock also is mist lubricated; it has an antifriction, air-operated center.

A reinforced carriage and apron give the extra rigidity needed for test turning. All machine operating controls are mounted on the apron.

Clearance diameter is 15 in.; the swing over the compound is 8 in. *Write*: Monarch Machine Tool Co., Sidney, O. *Phone*: 2-1381

AUTOMATIC
SHEARS
by HALLDEN
flexible design
cutting accuracy
continuous feed
rugged construction

"the shearing specialists"

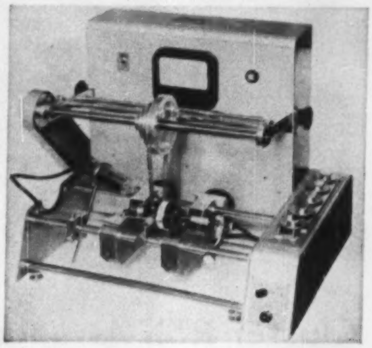
THE HALLDEN MACHINE CO.
THOMASTON, CONN.

Sales Representatives

The Wean Engineering Co., Inc., Warren, Ohio (Ferrous)
T. E. Dodds, Pittsburgh, Pa. (Non-Ferrous)
W. H. A. Robertson & Co., Ltd., Bedford, England
(Ferrous & Non-Ferrous)

Dynamic Balancing

This electronic balancing machine locates out of balance in two planes and indicates the amount of correction needed. Correction measurements are indicated on a meter. Angular location of the out of balance is pointed out by a stroboscopic lamp.



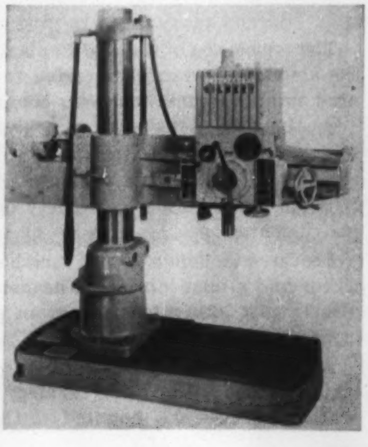
Masses as low as 0.0013 per cent of the total weight are measured. Rotation speeds go up to 2700 rpm.

Parts or assemblies up to 5 x 13 in. and weighing up to 10 lb can be handled. *Write*: Hickok Electrical Instrument Co., 10644 Dupont Ave., Cleveland 8, O. *Phone*: Liberty 1-8060

Radial Drill Columns

Flame-hardened surfaces protect 9 and 11-in. columns of radial drills against scoring.

Special alloy castings for the 5-ft columns are finish turned and then flame hardened to Rockwell C 52-56 to a depth of 1/16 to 3/32-in. The columns are then finish

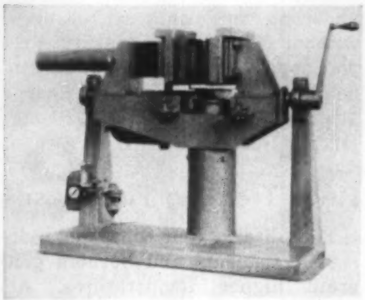


ground to close tolerances for straightness, roundness and high finish.

The process gives a harder wearing surface but avoids technical difficulties, such as cracking. *Write*: Cincinnati Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23, O. *Phone*: Kirby 1-4815

Shell Coreblower

This bench unit makes cores in either job lots or mass production quantities. Coreboxes can be up to 6 in. across the parting line, 12 in. wide and 10 in. long.



The new machine makes cores from existing metal core boxes. However, coreboxes designed for side blowing must be redesigned to blow into the parting line. It is not necessary to remove screen vents installed in the boxes. *Write*: Shallway Corp., 1000 S. Fourth Ave., Connellsville, Pa. *Phone*: 895

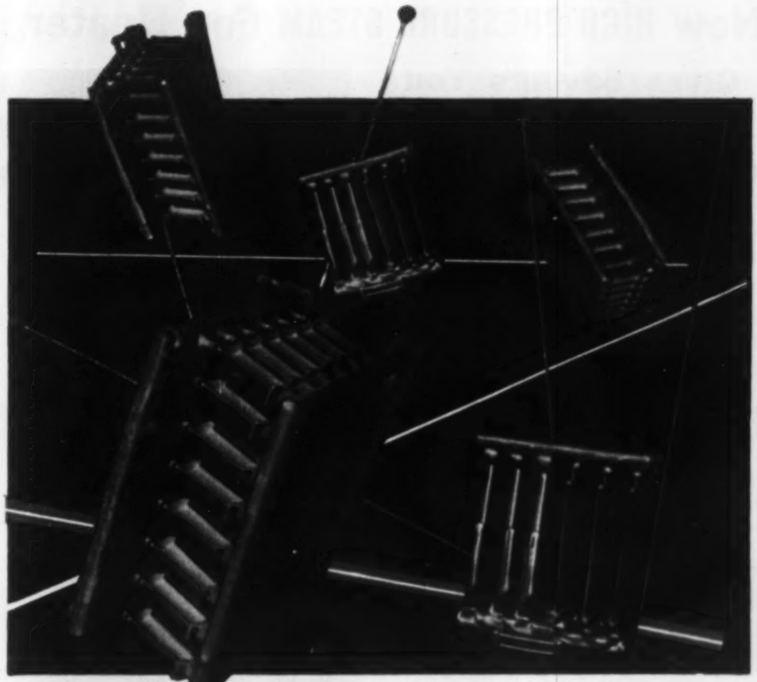
Height Set

Precision height setting from surface plates and machine tables is said to be done by this instrument with ease and speed.

It consists of a stand that has a hardened and lapped base, which supports a carrier with permanently mounted precision blocks spaced 1 in. apart.

A few turns of the micrometer head raises or lowers the measuring blocks, bringing settings in one-thousandths over the entire range of the instrument. Settings also can be made from the bottom surface of the blocks. Both 10 and 20-in. heights are available.

The vernier height gage is easy to read; jet black figures are set



austenal SKILL EXPERIENCE VERSATILITY

give you the Finest Investment Castings

These are the three fundamentals of Austenal production. Only all three brought together can guarantee the finest investment-cast parts for American defense and industry.

By means of Austenal's Microcast process such exact parts as jet turbine buckets and vanes are being cast, eliminating costly machining and holding finishing to a minimum. Thus, these vital jet components are available for national defense in greater numbers and more economically than ever before.

These three factors of sound production can work effectively for industry. Austenal has solved many industrial problems where fine, accurate and dependable cast parts were required for efficiency as well as economy.

Depend upon Austenal's greater skill, versatility and experience when you need investment castings. These are your assurance of the finest precision cast parts.

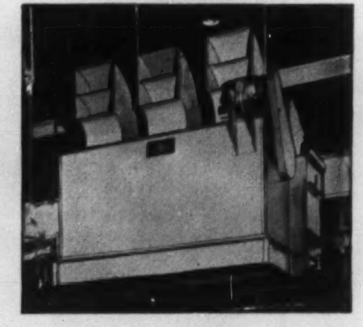
Write today for Austenal's informative booklet, "Design with Microcast in Mind".

®
austenal
LABORATORIES, INC.
microcast division
224 EAST 39th STREET • NEW YORK 16, N. Y.
7001 SOUTH CHICAGO AVENUE • CHICAGO 37, ILL.

New HIGH PRESSURE STEAM Fan Heater

Gives Savings You Never Had Before

The first heater to make High Pressure Steam really trouble-free and practical in plant heating. Every engineer should understand its original method; write for Niagara Bulletin and performance data.



HOW IT OPERATES: — A dual coil system makes use of all heat, both sensible and latent. High pressure steam enters the upper coil, shown on the diagram below. Its condensate drains into a trap. Then this high pressure condensate is released into the header of the lower coil. It instantly flashes into steam at vapor pressure.

Any high pressure condensate that remains liquid is carried to the vapor condensate return header by a drain tube that also gives off its heat into the air stream.

The vapor condenses in the lower coil. Its condensate is kept at a high level in the return leg by a wier in the return header so that all its heat is made useful and it is sub-cooled by contact with the coldest air entering the heater. Vacuum condensate return to boiler is vapor free.

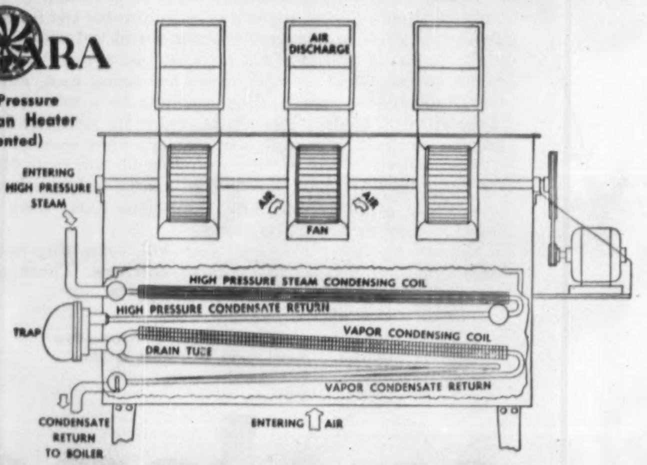
HOW IT SAVES IN COST: — Piping is much simpler and less costly than in low pressure systems. Much secondary piping, traps and big valves are not needed. Pipe sizes are smaller.

HOW IT SAVES IN OPERATION: — Waste is prevented. Every BTU goes where you want it. No dump traps or hot wells waste live steam.

HOW IT SAVES IN UPKEEP: — Condensate flow is even, vapor free, easily handled. No sudden surges of condensate in starting. No hammering, no hard wear and tear on system. Properly engineered for the job, final air temperatures are not excessive; heat easily directed where needed; no flashing of low pressure condensate. Heaters are self-draining on shut-down. Heaters are strongly built; all coils including the condensate drain tubes are hairpin bend, stress relieving. Use thru four heating seasons has proven these advantages in large scale plant heating.

NIAGARA

High Pressure Steam Fan Heater (Patented)

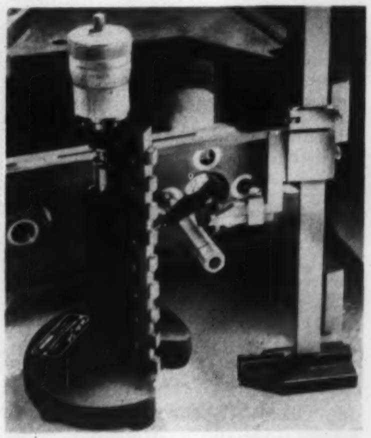

AIR DISCHARGE
FAN
AIR
AIR
ENTERING HIGH PRESSURE STEAM
HIGH PRESSURE STEAM CONDENSING COIL
HIGH PRESSURE CONDENSATE RETURN
TRAP
VAPOR CONDENSING COIL
DRAIN TUBE
VAPOR CONDENSATE RETURN
CONDENSATE RETURN TO BOILER
ENTERING AIR

NIAGARA BLOWER COMPANY
Dept. S, 405 LEXINGTON AVE., NEW YORK 17, N. Y.

Please send Bulletin 109 on the Niagara High Pressure Steam Fan Heater.

Name

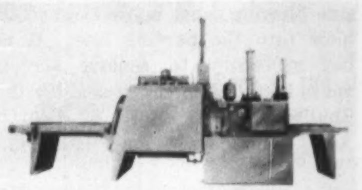
Address



on a dull chrome background. Graduations are machine cut. Over and under measurements can be made without reversing the marker. Vernier gages come in 12, 18 and 24-in. heights. *Write*: Brown & Sharpe Mfg. Co., Providence 1, R. I. *Phone*: Dexter 1-5000

Heat Treating Furnaces

Long-life ceramic tubes and redesigned elements and burners generate higher temperatures. Atmosphere circulation has been stepped up and maintenance costs reduced with a new fan design.



Heating capacity is 1000 lb an hour; maximum weight per charge is 1200 lb. Top operating temperature is 1850°F. *Write*: Ipsen Industries Inc., Rockford, Ill. *Phone*: 5-9581

Adjustable–Speed Drive

A drive for machine tool feeds gives a speed range of 100:1, with continuous electrical speed adjustment and a high degree of stability over the speed range. Capacity of the drive is from ½ to 4 hp.

The drives are packaged units with electronic control panels suitable for mounting and integrating with other machine controls. All small electrical parts are grouped,

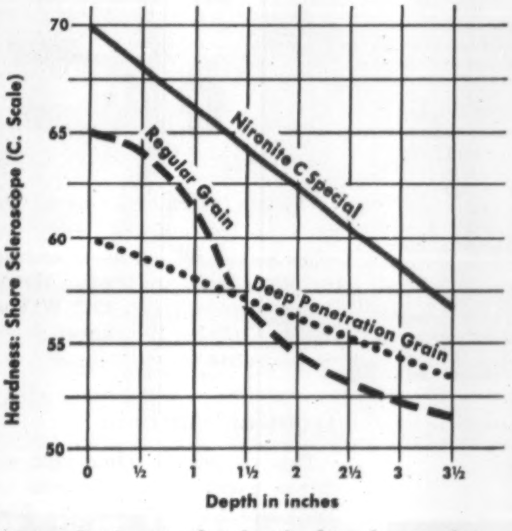
TIPS FROM A ROLL MAKER'S NOTEBOOK

MACKINTOSH-HEMPHILL DIVISION, E. W. BLISS COMPANY, Pittsburgh 3, Pennsylvania

Cast mill rolls • Johnston cinder pots • rotary tube straighteners • end-thrust bearings • heavy-duty lathes • steel and special alloy castings

How to pick rolls for bar and billet mills

The crux of the problem—Roughing a pass in a roll for a bar mill.



Generalized curves show how hardness decreases below the surface of three types of roll.

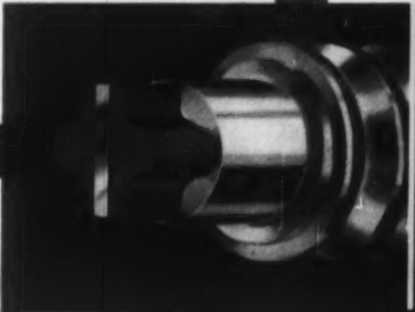
Like all rolls, those for the intermediate and finishing stands of bar and billet mills must possess the best possible balance of strength-vs.-hardness. However, they cannot be chosen on this basis alone.

The problem is complicated by the shape and depth of the passes. Many rolls must be cast plain because of the size of the passes or because of the roll user's need for plain rolls which may be turned for any section. Hence, large amounts of metal must be removed during turning.

As a result the metallurgist strives for two prime objectives in rolls for these applications. They are (1) the greatest possible depth of hardness and (2) fine grain structure to provide smoothness of work surface at the bottom of the passes.

A practical solution—The Nironite C Special roll is the answer that Mack-Hemp has developed to meet this problem. In this indefinite chill nickel-chromium alloy iron roll, depth of penetration is achieved by careful control of the carbon content. This results in deep penetration as well as less and finer graphite in the solidified iron. Hardness decreases very gradually as distance from the surface increases (see graph at left). Thus, this manipulation of carbon provides excellent wear resistance even at the bottom of deep passes. And the low graphite content which is assured by this special composition provides excellent surface condition at depths well below the original surface.

Nironite C Special rolls are only one example of the way Mack-Hemp can combine metallurgical research with nearly five generations' experience in the "art" of roll making to improve the performance of modern rolling mills. For help with your special rolling problem, write us today.

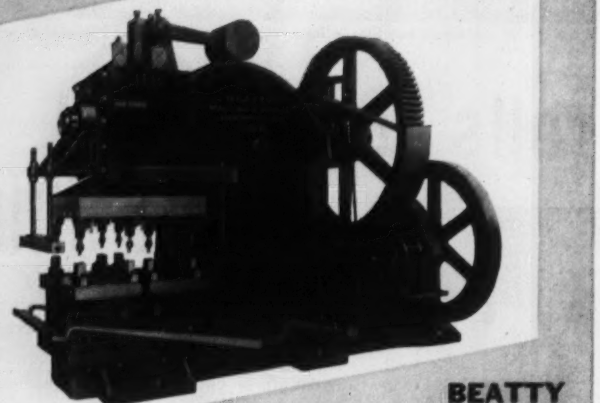


MACKINTOSH-HEMPHILL

You get more tonnage from the rolls with the Striped Red Wabblers

DIVISION OF **E. W. BLISS COMPANY**

FOR FASTER
HEAVY DUTY PUNCHING



BEATTY
No. 11-B Heavy Duty Punch

HANDLES EVEN THE MOST COMPLICATED PUNCHING IN A SINGLE PASS

BEATTY Guillotine Beam Flange Punch for flange punching of beams. Built-in adjustable tools save set-up time. 200 ton cap.

BEATTY Spacing Table handles web and flange punching without roll adjustment.

In less time, with less manpower, this BEATTY Heavy Duty Punch handles even the most complicated punching jobs . . . produces up to 34 patterns without a single tool change.

Used with the standard BEATTY Spacing Table, it accommodates steel shapes up to 65 ft. long and plates up to 42 in. wide. With exceptionally large die space, the machine can be tooled to the specific needs of the job—punches webs and flanges. Spacing of holes and slots is precise and practically automatic with the BEATTY Spacing Table.

In addition to increasing your output, this versatile unit reduces your labor costs. One operator and one helper are all the manpower required, and the machine is built for either right or left hand operation.

Consult a Beatty engineer for more information on a *job-engineered* BEATTY installation to fit your needs.

BEATTY Gap Type Press for forming, bending, flanging, pressing. 250 ton cap.

BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

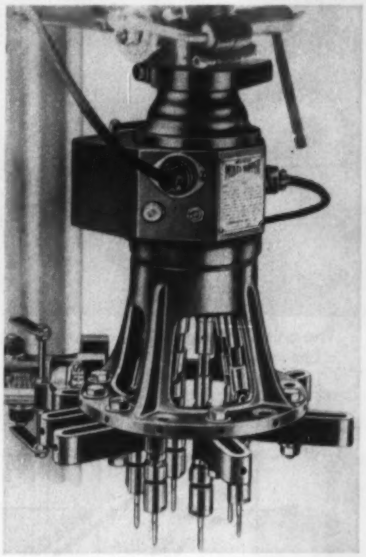
BEATTY
MACHINE & MFG. CO.
HAMMOND, IND.

wired and sealed in plastic for protection from harmful atmospheres, vibration and shock. *Write*: Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, O. *Phone*: Glenville 1-3530

Multiple Tapping

Up to eight holes can be tapped with this high production, universally adjustable multiple spindle tapping head. It will fit any drill press.

Pitch compensating spindles permit simultaneous tapping with taps of different pitch.



The tapper can be set up for any job in a few minutes. Only two adjustments, setting lower and upper stop limits, are needed. *Write*: Commander Mfg. Co., 4225 W. Kinzie St., Chicago, Ill. *Phone*: Sacramento 2-4544

Transfer Machine

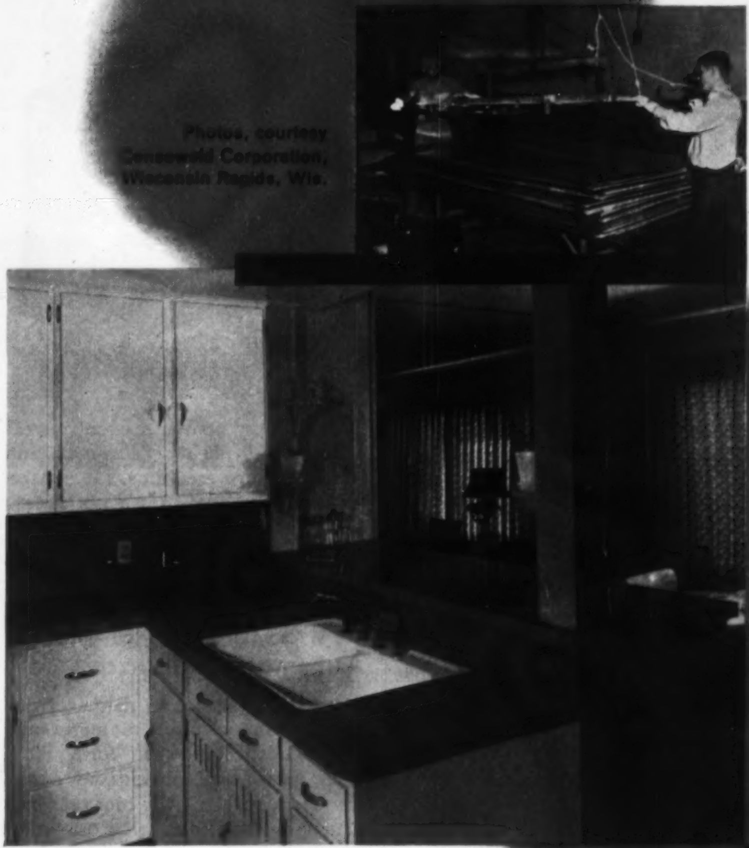
This segmented inline unit machines, gages, air tests, marks and assembles seals in cast iron chain case covers for V-8 auto engines. Rate: 108 pieces an hour (at 80 per cent efficiency).

The 40-station, 65-ft long machine is made up of eight segments, each having separate bases and control panels. A single transfer bar carries parts from station to station.

Drilling, countersinking, tapping,

The STAINLESS STEEL you can't see!

How the HOUSE OF STAINLESS Helps CONSOWELD Make the Largest Decorative Plastic Laminate Panels in the Industry . . .



Photos, courtesy Consoweld Corporation, Wisconsin Rapids, Wis.

When you admire the beauty of the plastic surfacing in the modern kitchen, you never think of the important part that stainless steel plays in producing it. While there is no stainless steel in the finished product, the smooth, hard, high-polished surface of stainless steel caul plates, used in the lamination process, makes possible the unmatched finish of this type of decorative material.

To expand their line, the Consoweld Corporation wanted to produce 51" x 144" panels designed to cover large areas more economically, provided they could obtain the extra-large stainless caul plates required.

The problem was put up to the House of Stainless and through our mill placement department, these unusually-large, highly-finished stainless plates were furnished.

Whether your particular need for stainless is routine or special, it will pay you to consult the House of Stainless. Here, specialists are ready to give you the benefit of long experience in selecting the *right* stainless for your needs and then give you fastest delivery possible from warehouse stocks or mill shipments through our mill placement department.

Just phone LAfayette 3-7210

The House of Stainless

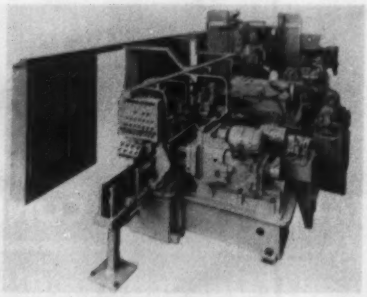
STEEL AT YOUR SERVICE

CHICAGO STEEL SERVICE COMPANY

Kildare Avenue at 45th Street, Chicago 32, Illinois
Mailing Address: P.O. Box 6308, Chicago 80, Illinois
Milwaukee District Office: 757 North Broadway, Milwaukee 2, Wisc. Telephone BRoadway 3-7874
Minneapolis District Office: 3501 Hennepin Avenue, Minneapolis 8, Minn. Telephone COlfax 2602

Sales Representative at:

Bloomington and Rockford, Illinois; Indianapolis and South Bend, Indiana; Cedar Rapids and Bettendorf, Iowa; Grand Rapids, Michigan; Appleton, Wisconsin.



boring and milling operations are done in the first five segments. Drilled holes are inspected in the third and fourth segments.

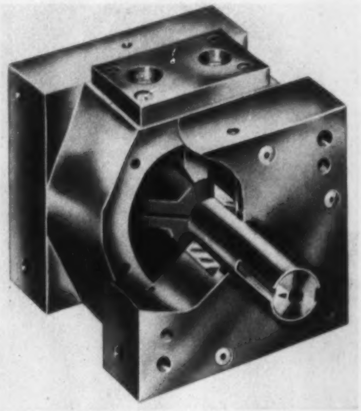
In the sixth segment, the chain case cover is tipped and rotated 90 degrees to orient the part for machining in the seventh segment.

After the parts leave the seventh segment, the transfer bar moves them through nine stations where they pass through a wash, rinse, drain and blow-off unit.

Parts are air tested for leaks at the eighth segment. Parts that leak are stamped automatically and rejected from the line. Oil seals are pressed in at the third station in this segment. *Write*: Snyder Tool & Engineering Co., 3400 E. Lafayette Ave., Detroit 7, Mich. *Phone*: Lorain 7-0123

Torque Motor

This square, instant oscillating torque motor gives up to 280-degree rotation. It turns, opens or closes, clamps, indexes, feeds, locks, pushes, mixes or moves any type of load or mechanism.



The motor operates equally well on air, oil, water or fire-resistant fluid pressure mediums. It can be mounted on any of its six faces.

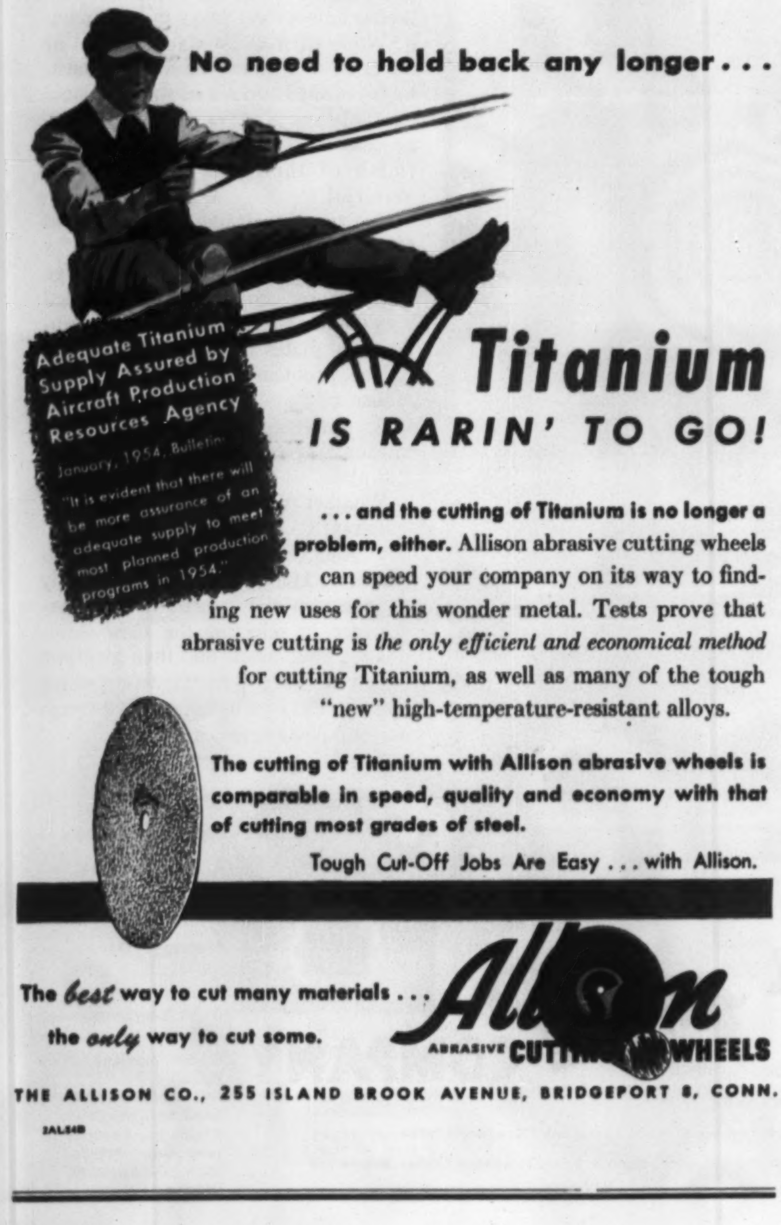
Motor speeds are limited only by fluid pressure volume. *Write*: Roto-Mation Motors Inc., 525 S. Riverside, St. Clair, Mich.

Automatic Deburrer

Internal gears and splines from 2 to 20 in. in pitch diameter are handled. Circular-type form tools with three or four cutting edges are used; rotating the tool presents a new cutting edge when the edge being used gets dull. Coolant flushes chips out of the work area.

The entire tooth form, including the root, is chamfered. If parts with improperly sized teeth are fed into the machine, no work is performed. After a predetermined number of consecutive rejects, the machine stops and a red light goes on.

Another new machine is used for external gears with pitch diameters from ⅝ to 6½-in. Its pro-



No need to hold back any longer . . .

Adequate Titanium Supply Assured by Aircraft Production Resources Agency

January, 1954, Bulletin:

"It is evident that there will be more assurance of an adequate supply to meet most planned production programs in 1954."

Titanium IS RARIN' TO GO!

. . . and the cutting of Titanium is no longer a problem, either. Allison abrasive cutting wheels can speed your company on its way to finding new uses for this wonder metal. Tests prove that abrasive cutting is *the only efficient and economical method* for cutting Titanium, as well as many of the tough "new" high-temperature-resistant alloys.

The cutting of Titanium with Allison abrasive wheels is comparable in speed, quality and economy with that of cutting most grades of steel.

Tough Cut-Off Jobs Are Easy . . . with Allison.

The *best* way to cut many materials . . . the *only* way to cut some.

Allison ABRASIVE CUTTING WHEELS

THE ALLISON CO., 255 ISLAND BROOK AVENUE, BRIDGEPORT 8, CONN.

2AL54B

USE *Industrial* HAND GEARED CRANES FOR GREATER ECONOMY

INDUSTRIAL CRANE
5 TON

The Industrial Hand-Geared Crane facilitates assembly of this heavy punch press by accurately spotting the component parts to line up bolt holes.

Courtesy of Di Machine Corp., Chicago, makers of Diebel High Production Presses.

When machinery or heavy loads are to be moved and where accurate spotting of these loads is a necessity Industrial Cranes do an outstanding job. These ruggedly built smooth operating cranes are ideal where runways are short and the production cycle is not too rapid.*

*Industrial Motor-Driven Cranes are recommended where high production rates must be maintained or runways are long.

Industrial
CRANES

Industrial CRANES ®

INDUSTRIAL CRANE & HOIST CORPORATION
1503 S. Paulina Street
Chicago 8, Illinois
Send Copy of Hand Geared Crane Bulletin.

Name____________________
Company____________________
Address____________________
City, State____________________

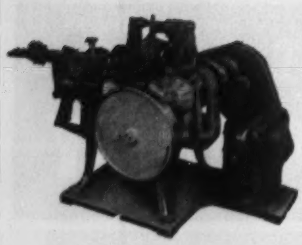
INDUSTRIAL CRANE & HOIST CORPORATION

(formerly Industrial Equipment Co.)

1503 S. Paulina Street
Chicago 8, Illinois

Overhead Cranes • Jib Cranes • Monorail Systems • Crane Runways

[illegible] in Principal Cities



NILSON 4-SLIDES
PAY OFF 4 WAYS

- BIG PROFITS • BIG PRODUCTION
- BIG SAVINGS • BIG GAIN IN ACCURACY

Forming Operation: Meter Shunts of 3/16" Wire Stock

WHY NILSON IS TOPS FOR 4-SLIDES:

Nilson 4-Slides are built for rugged duty
Form both ribbon metal and wire stock
Press capacities 8 to 75 tons, wire diameter to ½"

16 Models Available, Including Combinations of Horizontal Press and 4-Slide

YOU PROFIT BY: Automatic Operation • Increased Production • No Secondary Handling • Improved Products • Fewer Rejects • Lowest Initial Cost

Nilson engineers are always available for consultation on forming problems. Bulletin #61 sent on request.

Nilson's 3 tilt and 3 stationary reels handle wire or ribbon stock coils up to 500 pounds.

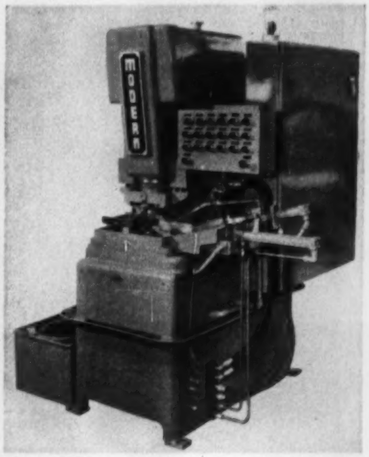
A.H. NILSON
MACHINE COMPANY

1512 RAILROAD AVENUE, BRIDGEPORT 5, CONN.

Automatic Chain Making Machines • Staple Forming Machines • Wire and Stock Reels • Wire Straightening Equipment • Slide Feeds for Presses • Wire and Ribbon Stock Forming Machines

duction rate depends on the number of teeth. A 30-tooth gear can be deburred and chamfered on both sides at the rate of 300 an hour.

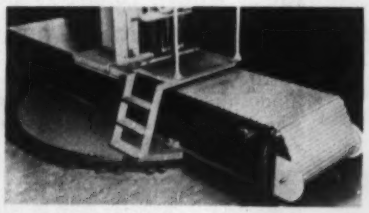
Long-life, high-speed steel form tools give top production between grinds. Changing tools is quick and easy. A sharp dove tail-type form tool can be reset in the tool holder without gaging by bringing it up against a stop that bears on the front face of the tool. Both machines can change from one gear to another by making minor changes in tooling. *Write*: Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 38, Mich. *Phone*: Webster 3-7280



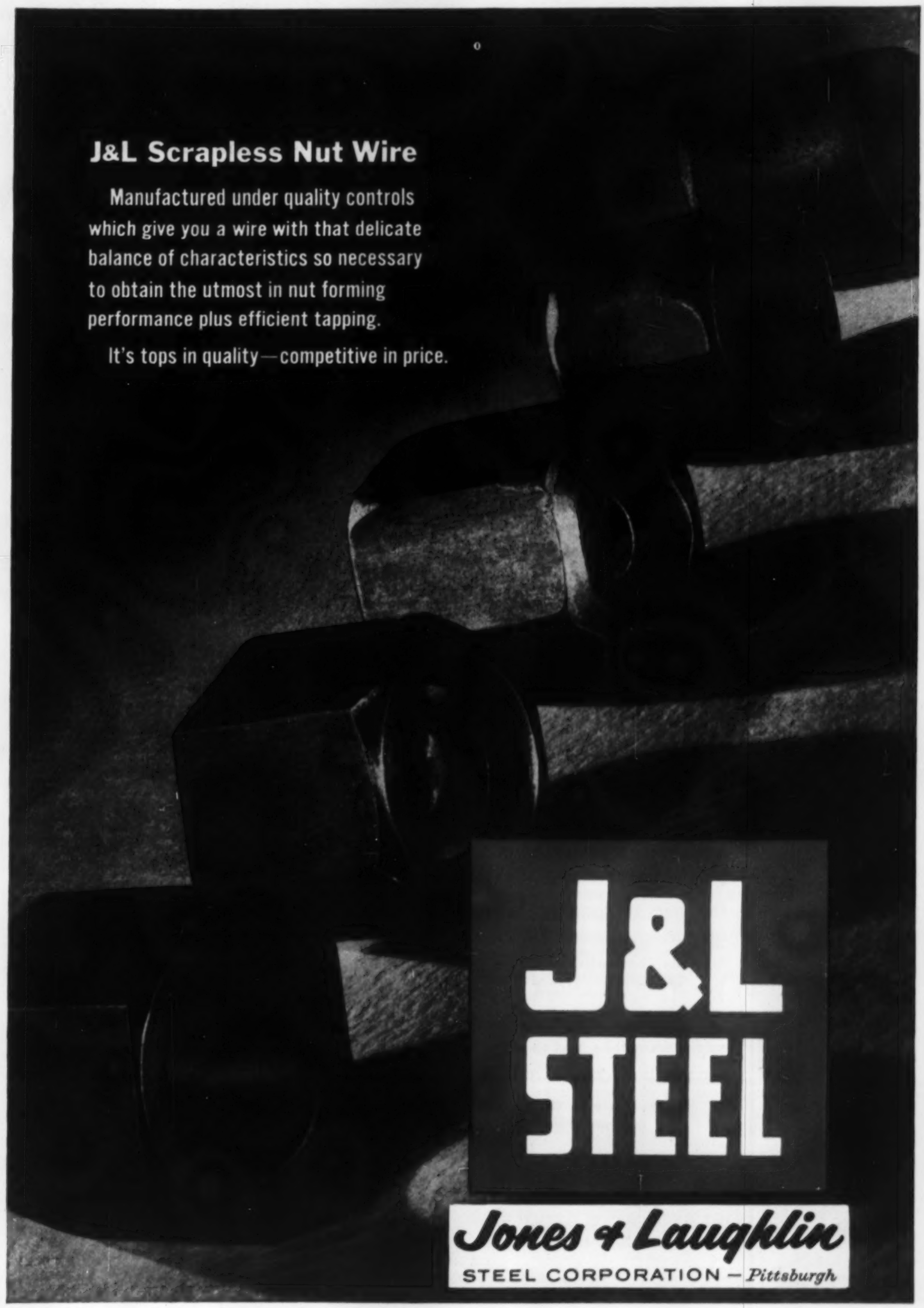
Way Cover

Ways on boring mills, planers, large grinders and vertical milling machines can be protected by a new extruded aluminum cover.

The cover prevents chips, grit or any foreign material from clogging or damaging ways or way mechanisms.



Built of interlocking panels 1½-in. wide, the cover is custom made to fit any width or length machine and will not burn, tear or dent. Panels roll up compactly and auto-



J&L Scrapless Nut Wire

Manufactured under quality controls which give you a wire with that delicate balance of characteristics so necessary to obtain the utmost in nut forming performance plus efficient tapping.

It's tops in quality—competitive in price.

J&L
STEEL

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

10 TONS
OR ONE OUNCE

Horsburgh & Scott Gears Meet Your Requirements Exactly

You can get practically every kind and every size gear you need from Horsburgh & Scott. Expert engineering, skilled craftsmanship and top quality materials assure you of the best possible gears for every job.

Our years of experience engineering and manufacturing all kinds of gears and speed reducers is available to help you in the design and selection of the best gearing for your application.

If you have a gear or speed reducer problem our engineers will be glad to help you. Just send us the details or call. There is no obligation.

Send note on Company Letterhead for complete H & S Catalog.

THE HORSBURGH & SCOTT CO.
GEARS AND SPEED REDUCERS
5112 Hamilton Avenue
Cleveland 14, Ohio

matically at either end of the machine. Installation is economical and simple, usually performed by plant personnel. *Write*: Futurmill Inc., 6360 Highland Rd., Pontiac, Mich.

Fork Lift Truck

This truck has a capacity of 5000 lb at a 24-in. load center. It is powered by a six-cylinder, Chrysler industrial engine.

A fluid coupling is used with a directional control; there is no clutch, no gears to shift. A fingertip control, placed for right-hand operation, gives forward and reverse movement.

Another lever controls the two-speed transmission which gives a high and a low range in both forward and reverse. A single control operates the fork hoist and the mast tilt.

A combination ball-bearing, worm-and-nut steering mechanism gives shockless, easy steering. *Write*: Lamson Mobilift Corp., Syracuse 1, N. Y.

Energy Analyzer

This instrument determines the operating efficiency of machines driven by electric motors by measuring the productive time and energy involved.

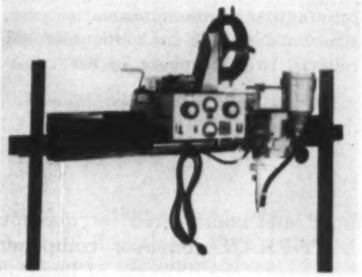
Once the analyzer integrates time and energy, the following can be determined: Machine utilization; the best cutting tool, cutting oil and coolant; standards for cutting tool life; machinability index; horsepower needed at the tool to remove 1 cu in. of metal a minute; tangential cutting force in pounds at the tool; cutting tool efficiency index; and the rate of doing work and work standards.

The automatic instrument is portable. It is adaptable to 220 or 440-volt, 3-phase, 60-cycle current for driving 1-to-30-hp motors at 220 volts or 2-to-60-hp motors at 440 volts. *Write*: Stewart Instrument Co., 6507 Grand River, Detroit 8, Mich. *Phone*: Tyler 8-1050

Beam Carriage

Submerged arc, inert gas or open arc welding is controlled by the beam carriage. Travel speed ranges from 8 to 300 ipm.

An adjusting screw can be used to raise or lower the welding head about an inch to control the distance between the welding current tip and the work.



The carriage is powered by a 110-v, dc motor. A friction roll, held against the back rail of the beam by a spring, propels the carriage on six permanently lubricated, sealed rollers. *Write*: Hobart Bros. Co., Hobart Square, Troy, O. *Phone*: 2-1223

Stock Feeder

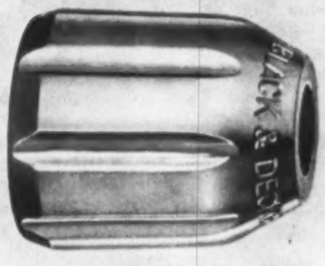
This air-operated power press feed makes a light contact with the material. Rollers grip in direct proportion to the resistance met, but sheets are not marked, nicked or work hardened.

The feed has speed adjustment on both forward and reverse strokes. It will feed stock to almost unlimited lengths. A built-in mechanism operates the press. *Write*: Nadel Tool & Mfg. Co. Inc., 20 Warren St., New York 7, N. Y. *Phone*: Courtland 7-8236

now you can get this brilliant finish directly on zinc die castings!

No electroplating--no mechanical finishing!

PART AS CAST



TREATED WITH NEW IRIDITE

NEW IRIDITE® (Cast-Zinc-Brite)

brightens zinc die castings by chemical polishing, protects against corrosion

NOW, FOR THE FIRST TIME you can get a brilliant, decorative finish directly on zinc die-cast parts . . . without mechanical finishing, without electroplating! The luster is provided by the *chemical polishing* action of new Iridite (Cast-Zinc-Brite) solution. Even surface blemishes, such as cold shuts, are brightened by this new process. No electrolysis. No special equipment. No specially trained personnel. Just a simple chemical dip for a few seconds and the job is done. And, this new Iridite has been *tested and proved* in production.

CORROSION RESISTANCE, TOO! New Iridite (Cast-Zinc-Brite) provides exceptional corrosion resistance for bright-type chromate finishes . . . also guards against blueing or darkening by eliminating zinc plate formerly required in bright chromate finishing of zinc die castings.

AS A BASE FOR ELECTROPLATING—Lower mechanical finishing costs are possible where plated finishes are *required* since the brightness provided by this new Iridite may be sufficient.

LET US SHOW YOU what Iridite (Cast-Zinc-Brite) can do for you. Send us at least a half-dozen typical zinc die-cast parts for FREE PROCESSING for your own tests and evaluation. Or, for immediate information, call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified 'phone book. *IMPORTANT: when you give us samples for test processing, please be sure to identify the alloy used.*

Iridite is approved under government specifications

ALLIED RESEARCH PRODUCTS
INCORPORATED
4004-06 E. MONUMENT STREET • BALTIMORE 5, MD.

Manufacturers of Iridite Finishes for Corrosion Protection and Paint Systems on Non-Ferrous Metals; ARP Plating Chemicals

NEW Literature

Write directly to the company for a copy

Name Plates

An anodized, etched aluminum name plate for trademarking, numbering and labeling is described—4 pages. C & H Supply Co., 417 E. Beach Ave., Inglewood, Calif.

Roller Conveyors

Product features of a pre-engineered roller line are covered—bulletin GP, 6 pages. Alvey-Ferguson Co., GP & Disney Sts., Cincinnati 9, O.

Fume Control

Depicted is the control of dust and fumes from electric steel melting furnaces—4 pages. Wheelabrator Corp., 1157 S. Byrkit St., Mishawaka, Ind.

Machine Tool Accessories

A complete line of holders and adaptors, mills, drills, reamers, boring bars, arbors, chucks and collets is presented along with engineering data—catalog 55, 50 pages. Beaver Tool & Engineering Corp., Box 429, Royal Oak, Mich.

Centerless Grinders

Applications and automation ideas are given for two precision grinders—catalog T-55, 26 pages. Landis Tool Co., Waynesboro, Pa.

Magnetic Drums

Applications and features of permanent magnetic drums for removal of tramp iron are given—bulletin MD-200, 6 pages. Dept. 149, Homer Mfg. Co. Inc., Lima, O.

Wheelheads

Complete technical data on high-frequency wheelheads for internal grinding are given—8 pages. Bryant Chucking Grinder Co., Springfield, Vt.

Metalworking Presses

Described are presses for extruding, forming and drawing, crimping and straightening, forging, bending, flanging and pipe fabricating—bulletin 3201, 12 pages. Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

Materials Handling

Unitizing, the process of grouping individual packages or products into a single unit, is described—16 pages. Acme Steel Products Division, Acme Steel Co., 2840 Archer Ave., Chicago, Ill.

Automatic Feeders

Elevating, blade, rotary and vibratory feeders are described—15 pages. Feedall Inc., 38399 Pelton Rd., Willoughby, O.

Industrial Floors

The manual tells how to install a new floor over an old one—48 pages. Stonhard Co., 1306 Spring Garden St., Philadelphia 23, Pa.

Plastic Sheets

Applications in industrial fields and processing procedures are given—Scotchply Reinforced Plastic Division, Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul 6, Minn.

Corrosion Resistance

This catalog features new construction materials and evaluates equipment molded from polyvinyl chloride, epoxy glass and polyester glass—catalog C-12, 32 pages. Haveg Corp., 900 Greenbank Rd., Wilmington 8, Del.

Gas Regulators

Service regulators are illustrated. Graphs show mathematically the determination of maximum outlet pressure build-up and the amount of gas relieved to atmosphere by safety de-

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NEW LITERATURE

vices—bulletin 1026, 20 pages. Meter & Valve Division, Rockwell Mfg. Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.

Production Threading

A broaching machine for threading large nuts and other internally threaded parts is described—bulletin 50054, 4 pages. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Electric Resistance Welding

Industrial uses, manufacture and service, operation and types of welding machines are covered—bulletin 333, 12 pages. Dept. L-5, Sciaky Bros. Inc., 4915 W. 67th St., Chicago, Ill.

Gas Cutting Machine

Multiple torch machine and its accessories are illustrated—catalog 804B, 12 pages. Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y.

Machine Tools

Condensed catalog illustrates table and floor-type horizontal boring mills, rotary tables, radial drills and an autopositioner. Cincinnati Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23, O.

Melting Furnace

Operation of an integrated melting and automatic pouring unit for making aluminum diecastings is covered —bulletin R-48, 4 pages. Ajax Engineering Corp., Trenton, N. J.

Overhead Rail Systems

Engineering and application data for overhead track systems are presented—booklet 2008-L, 12 pages. Cleveland Tramrail Division, Cleveland Crane & Engineering Co., Wickliffe, O.

Tool and High Speed Steels

Here's information on the analyses, red hardness, abrasion resistance, toughness, size stability and machinability of steels. Sales Dept., Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa.

Diamond Tools

Described are diamond tools, dressers and a diamond setting machine. Diamond Products Inc., 329 Prospect Ave., Elyria, O.

Investment Casting

The influence of castability on alloy selection is discussed—24 pages. Engineered Precision Casting Co., Box 68, Matawan, N. J.

Tube Bender

Described is a worm gear device for manual bending to exact tolerances—bulletin 1141A12, 4 pages. Tube & Hose Fittings Division, Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, O.

Barrel Finishing

Four classes of compounds for finishing and the process are described —bulletins A, B, C and D—each 4 pages. Newton Industries Inc., 100 Saw Mill Road, West Haven, Conn.

Copper-Base Alloys

This engineering manual gives complete information on copper-base alloys in rod form—28 pages. Mueller Brass Co., Port Huron, Mich.

Aluminum Pipe

Characteristics, advantages and installation details of aluminum pipe and fittings are given—18 pages. Aluminum Co. of America, 770 Alcoa Bldg., Pittsburgh 19, Pa.

Lathes and Grinders

New 16-speed lathes are described —bulletin 201, 8 pages. Vertical universal grinders are covered—bulletin 197, 8 pages. Springfield Machine Tool Co., Springfield, O.

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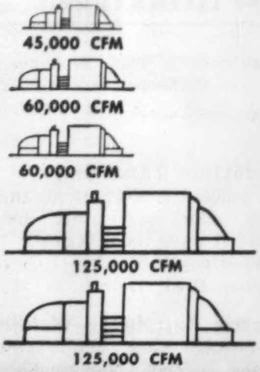
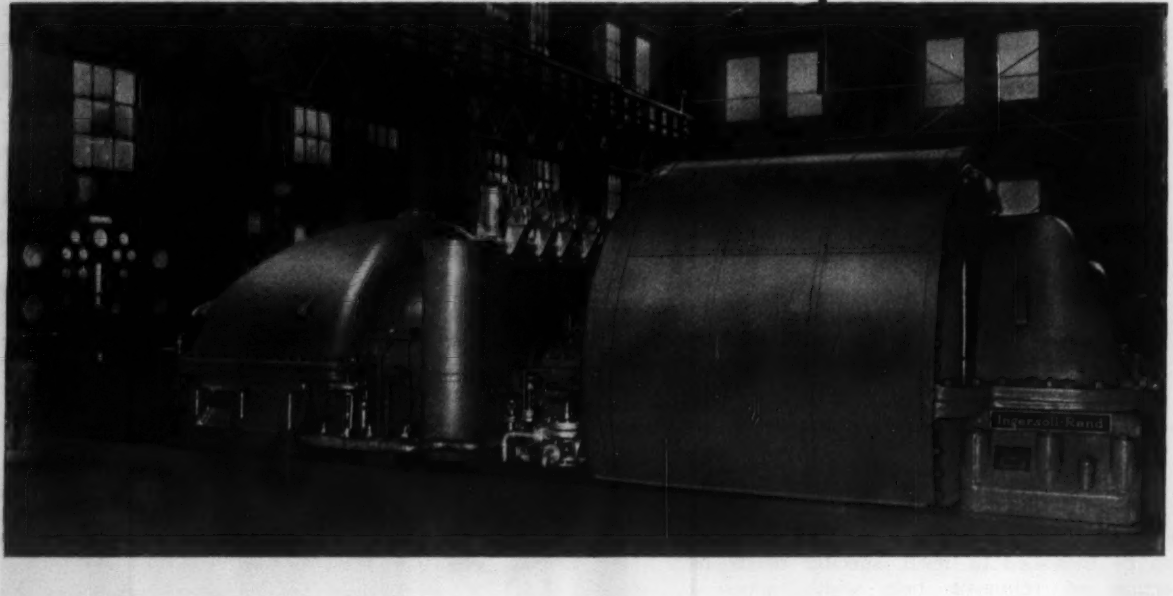
now in service at

Youngstown Sheet and Tube Company's Indiana Harbor Plant





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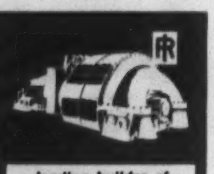

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STEEL
November 14, 1955

Market Outlook

PRICE INCREASES and heavier demand are near-term prospects in the steel industry.

Economic pressures are building up to a point where steel prices must rise—perhaps $12 a ton by mid-1956 (see page 59). The pressures are: 1. Steel production cost increases (particularly on materials) arising from the 1955 wage boosts. 2. Need for money to renew present plant and equipment and to expand.

TIMETABLE—The price increases aren't likely to come in one swoop. They're more likely to come piecemeal this year and next, with a climax at next midyear when the steelworkers' contract is renegotiated. Products that will see the first increases will be those on which producers are the most severely pinched profitwise.

BUILD-UP— Meanwhile, steel demand—already keeping production at capacity—is building up even more. The build-up is noticeable particularly for steel plates, and it comes from a big jump in demand for railroad freight cars, pipelines and Army tanks. Although all railroads are showing heightened interest in freight car purchases, the New York Central System has inquired for 14,750 freight cars, the largest inquiry in years. Another big use of plates will be made in a gas pipeline for Canada. For the first section of the line, National Tube Division of U. S. Steel Corp. will fabricate 200,000 tons of 34-in. pipe. The line eventually will be 2300 miles long and will take 800,000 tons of pipe. (That's as much as the steel industry turns out in 2.5 months.) The Army tank order that will take plates was awarded to the Schenectady, N. Y., plant of Alco Products Inc. The number of tanks involved was not revealed, but they cost $73 million.

Already helping keep plates in heavy demand are construction requirements. Ship work will add to the demand, too.

TRIO— Two other products stand out with plates as the tightest of all forms of steel. They are: Structural shapes and hot-rolled sheets.

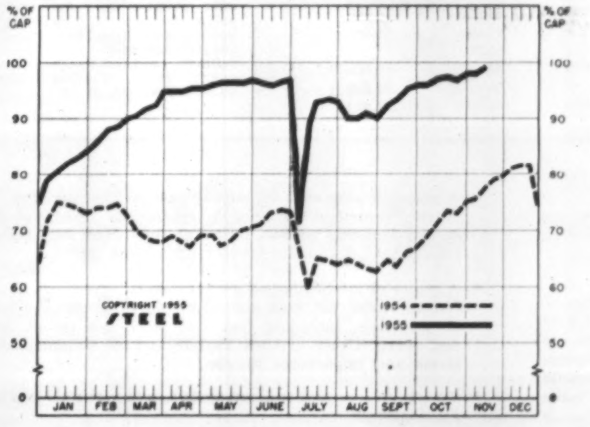
Heavy demand for steel is forcing mill quantity buyers of steel to turn increasingly to warehouses for supplies, but warehouses can be of only limited assistance because they, too, can't get all the shapes, plates and hot-rolled sheets they need.

The heavy pressure for steel has given rise to reports of inability to place defense-rated orders. A task force of the steel industry was looking into the matter last week (see page 63). The group also was studying the nickel shortage and the near exhaustion of supplies for producing stainless steel (see page 173).

BOOMING—To try to satisfy the booming demand, the steel industry has been operating at or near capacity levels for the last three weeks. In the week ended Nov. 13, production of steel for ingots and castings rose 1 point to 99 per cent of capacity.

SOLID— STEEL's arithmetical price composite remains unchanged at $128.14 a net ton, but its steelmaking scrap price composite rose for the second consecutive week. It's now $45.33 a gross ton and reflects the strong demand for steel, export demand for scrap and the approach of winter.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Nov. 13	Change	Same Week 1954	Same Week 1953
Pittsburgh	103	+ 1*	75.5	88.5
Chicago	98	— 1*	81	98
Mid-Atlantic	97.5	0	70	94
Youngstown	100	+ 3	76	96
Wheeling	99	+ 0.5	91.5	99
Cleveland	101.5	0*	88	98.5
Buffalo	105	0	95.5	106.5
Birmingham	94	0	64	96.5
New England	91	0	59	85
Cincinnati	92.5	+ 2.5	75	68
St. Louis	106	0	87	89
Detroit	99	+ 2	80	97.5
Western	100	+ 2	86	100
National Rate	99	+ 1	75	92.5

INGOT PRODUCTION‡

	Week Ended Nov. 13	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	147.7†	149.4	145.6	116.7
NET TONS (In thousands)	2,372†	2,400	2,330	1,874

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,413,278 in 1955; 2,384,549 in 1954; 2,254,459 in 1953.

Metalworking Outlook—p. 53 Technical Outlook—p. 111

Price Indexes and Composites

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	Nov. 8 1955	Nov. 1 1955	Month Ago	Oct. Average
(1947-1949=100)	154.5	154.5	154.5	154.5

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Nov. 8

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parenthesis. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, Standard, No. 1	$4.800
Rails, Light, 40 lb	6.217
Tie Plates	5.625
Axles, Railway	8.000
Wheels, Freight Car, 33 in. (per wheel)	52.50
Plates, Carbon	4.950
Structural Shapes	4.867
Bars, Tool Steel, Carbon (lb)	0.460
Bars, Tool Steel Alloy, Oil Hardening Die (lb)	0.560
Bars, Tool Steel, H.R., Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.185
Bars, Tool Steel, H.R. Alloy, High Speed W-18, Cr 4, V 1 (lb)	1.680
Bars, H.R., Alloy	9.375
Bars, H.R., Stainless, 303 (lb)	0.450
Bars, H.R., Carbon	5.350
Bars, Reinforcing	5.313
Bars, C.F., Carbon	8.660
Bars, C.F., Alloy	12.175
Bars, C.F., Stainless, 302 (lb)	0.468
Sheets, H.R. Carbon	5.145
Sheets, C.R., Carbon	6.239
Sheets, Galvanized	7.690
Sheets, C.R., Stainless, 302 (lb)	0.588
Sheets, Electrical	$10.200
Strip, C.R., Carbon	7.993
Strip, C.R., Stainless, 430 (lb)	0.444
Strip, H.R., Carbon	5.350
Pipe, Black, Buttweld (100 ft)	16.366
Pipe, Galv., Buttweld (100 ft)	19.971
Pipe, Line (100 ft)	158.925
Casing, Oil Well, Carbon (100 ft)	165.120
Casing, Oil Well, Alloy (100 ft)	244.670
Tubes, Boiler (100 ft)	39.470
Tubing, Mechanical, Carbon	20.980
Tubing, Mechanical, Stainless, 304 (100 ft)	178.897
Tin Plate, Hot-dipped, 1.25 lb	8.933
Tin Plate, Electrolytic, 0.25 lb	7.633
Black Plate, Canmaking Quality	6.733
Wire, Drawn, Carbon	8.575
Wire, Drawn, Stainless 430 (lb)	0.578
Bale ties (bundle)	6.473
Nails, Wire, 8d Common	8.618
Wire, Barbed (80-rod spool)	7.847
Woven Wire Fence (20-rod roll)	18.635

STEEL's FINISHED STEEL PRICE INDEX*

	Nov. 9 1955	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	208.90	208.90	268.90	194.53	157.76
Index in cents per lb	5.659	5.659	5.659	5.270	4.274

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$128.14	$128.14	$128.14	$117.95	$95.09
No. 2 Fdry, Pig Iron, GT	58.99	58.99	58.99	56.64	49.54
Basic Pig Iron, GT	58.49	58.49	58.49	56.04	49.04
Malleable Pig Iron, GT	59.77	59.77	59.77	57.27	50.27
Steelmaking Scrap, GT	45.33	45.17	45.33	33.67	41.67

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Nov. 9 1955	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.65	4.65	4.65	4.30	3.45
Bars, H.R., Chicago	4.65	4.65	4.65	4.30	3.45
Bars, H.R., deld. Philadelphia	4.90	4.90	4.90	4.55	3.93
Bars, C.F., Pittsburgh	5.90	5.90	5.90	5.40	4.15
Shapes Std., Pittsburgh	4.60	4.60	4.60	4.25	3.40
Shapes, Std., Chicago	4.60	4.60	4.60	4.25	3.40
Shapes, deld., Philadelphia	4.88	4.88	4.88	4.53	3.46
Plates, Pittsburgh	4.50	4.50	4.50	4.225	3.50
Plates, Chicago	4.50	4.50	4.50	4.225	3.50
Plates, Coatesville, Pa.	4.80	4.80	4.50	4.225	3.90
Plates, Sparrows Point, Md.	4.50	4.50	4.50	4.225	3.50
Plates, Claymont, Del.	4.80	4.80	4.50	4.225	3.90
Sheets, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.35
Sheets, H.R., Chicago	4.325	4.325	4.325	4.05	3.35
Sheets, C.R., Pittsburgh	5.325	5.325	5.325	4.95	4.10
Sheets, C.R., Chicago	5.325	5.325	5.325	4.95	4.10
Sheets, C.R., Detriot	5.325-5.425	5.325-5.425	5.325-5.425	5.10	4.30
Sheets, Galv., Pittsburgh	5.85	5.85	5.85	5.45	4.40
Strip, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.50-3.75
Strip, H.R., Chicago	4.325	4.325	4.325	4.05	3.25
Strip, C.R., Pittsburgh	6.25	6.25	6.25	5.75	4.15-4.85
Strip, C.R., Chicago	6.35	6.35	6.35	5.85	4.30
Strip, C.R., Detroit	6.35	6.35	6.35	5.60-5.90	4.35-5.10
Wire, Basic, Pittsburgh	6.25	6.25	6.25	5.75	4.50-4.75
Nails, Wire, Pittsburgh	7.60	7.60	7.60	6.85	5.30-5.60
Tin plate (1.50 lb), box, Pitts.	$9.45	$9.45	$9.45	$9.05	$7.50

SEMIFINISHED STEEL

Billets, Forging, Pitts. (NT)	$84.50	$84.50	$84.50	$78.00	$63.00
Wire rods, 7/32-⅞" Pitts.	5.025	5.025	5.025	4.675	3.85

PIG IRON, Gross Ton

Bessemer, Pitts.	$59.50	$59.50	$59.50	$57.00	$50.00
Basic, Valley	58.50	58.50	58.50	56.00	49.00
Basic, deld. Phila.	62.16	62.16	59.16	59.66	50.39
No. 2 Fdry, Pitts.	59.00	59.00	59.00	56.50	49.50
No. 2 Fdry, Chicago	59.00	59.00	59.00	56.50	49.50
No. 2 Fdry, Valley	59.00	59.00	59.00	56.50	49.50
No. 2 Fdry, deld. Phila.	62.66	62.66	59.66	50.16	53.89
No. 2 Fdry, Birm.	55.00	55.00	55.00	52.88	45.88
No. 2 Fdry (Birm.) deld. Cin.	62.70	62.70	62.70	60.58	52.58
Malleable, Valley	59.00	59.00	59.00	56.50	49.50
Malleable, Chicago	59.00	59.00	59.00	56.50	49.50
Ferromanganese, Duquesne.	190.00†	190.00†	190.00†	190.00†	175.00*

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†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (including broker's commission)

No. 1 Heavy Melt, Pitts.	$44.50	$44.50	$44.50	$34.50	$44.00
No. 1 Heavy Melt, E. Pa.	47.00	46.50	46.50	33.50	41.00
No. 1 Heavy Melt, Chicago	44.50	44.50	45.00	33.00	40.00
No. 1 Heavy Melt, Valley	48.00	48.00	48.00	35.50	43.75
No. 1 Heavy Melt, Cleve.	45.50	45.50	44.50	33.50	43.25
No. 1 Heavy Melt, Buffalo	43.50	43.50	38.50	31.50	41.50
Rails, Rerolling, Chicago	65.50	65.50	65.50	54.50	64.50
No. 1 Cast, Chicago	47.50	47.50	48.50	39.50	53.50

COKE, Net Ton

Beehive, Furn, Connlsvl.	$13.625	$13.625	$13.625	$13.75	$14.25
Beehive, Fdry, Connlsvl.	16.50	16.50	16.50	16.75	16.50
Oven, Fdry, Chicago	25.75	25.75	25.75	24.50	21.00

Daily Nonferrous Price Record

	Price Nov. 9	Last Change	Previous Price	Oct. Avg.	Sept. Avg.	Nov. 1954 Avg.
Copper	43.00-45.00	Oct. 7, 1955	43.00-50.00	44.594	45.380	30.000
Lead	15.30	Sept. 26, 1955	14.80	15.300	14.920	14.800
Zinc	13.00	Oct. 21, 1955	13.00-13.50	13.020	12.940	11.500
Tin	96.25	Nov. 9, 1955	96.375	96.230	96.565	91.196
Nickel	64.50	Nov. 24, 1954	60.00	64.500	64.500	60.000
Aluminum	24.40	Aug. 8, 1955	23.20-24.40	24.400	24.400	22.200
Magnesium	32.50	Aug. 16, 1955	28.50	32.500	32.500	27.000

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld, New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, 99.8%, Freeport, Tex.

What You Can Use the Markets Section for:

- **A source of price information.**
  Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.
- **A directory of producing points.**
  Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.
- **A source of price data for making your own comparisons.**
  Maybe you want to keep a continuous record of price spread between various forms of steel. You can get your base price information from STEEL's price tables.
- **A source of information on market trends.**
  Newsy items tell you about the supply-demand situation of materials, including iron and steel, nonferrous metals and scrap. Other articles analyze special situations of interest and importance to you.
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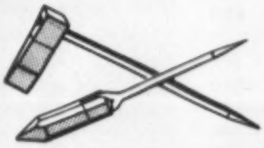
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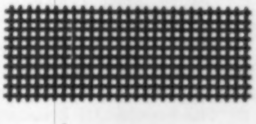
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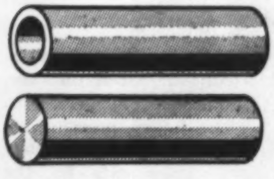
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BRASS or BRONZE WOOD and MACHINE SCREWS

BRASS ESCUTCHEON PINS

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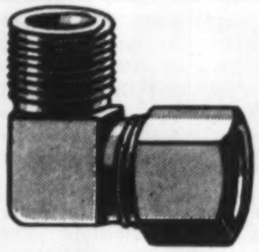
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Nonferrous Metals

Outlook for lead and zinc shows stable prices and high level demand should continue. Users stress importance of "status quo" prices

Nonferrous Metal Prices, Pages 164 & 165

INDUSTRY SPOKESMEN for lead and zinc are smiling, but they have their fingers crossed a little. Demand is expected to continue at high levels through the remainder of this year and into 1956, but if prices get out of hand, users may turn to substitutes or foreign suppliers.

Zinc—Slab zinc consumption (1955) is expected to exceed 1 million tons (see table). Previous highs were registered in 1950 (985,927 tons) and 1953 (985,927 tons).

Galvanizing is using some 14 per cent more slab zinc this year than last, while the zinc diecasting industry has boosted its consumption more than 48 per cent over 1954 figures (January-August). The American Die Casting Institute estimates that some 360,000 tons of zinc diecastings will be consumed this year. The 1956 total will reach 385,000 tons. Although some automobile models are dropping diecast zinc grilles, use of zinc diecastings in the automotive field will increase by about 10 per cent during 1956. Reason: More diecastings than ever before are being used for trim and the internal parts of the '56 models. The electrical and home appliance field—with air conditioners leading the way—will use more zinc diecastings next year.

Prices—Zinc prices should remain firm through the rest of this year. Any price increase, without a corresponding increase by the London Metal Exchange, could bring an avalanche of foreign zinc into the U. S. There also is a growing feeling that a further advance in price may see users "shopping around" for substitute materials.

Lead—The week ending Oct. 19 saw sales of some 24,600 tons of lead. While this was an exceptional week, it indicates the strong demand. With a firm market and the London Metal Exchange quoting 13.3 cents a pound for lead, there will be little price change in the immediate future. Point to remember: If the LME price should go up, the U. S. would probably follow. While several companies were able to stand on their price of zinc, none of the primary producers of lead can hold the line—stocks are too low.

There are several new uses developing for lead. Porcelain enameled aluminum calls for a 40 per cent lead content. Experts estimate that by 1965 some 30,000 tons of lead (annually) will be used in this application alone. It is also being used in shipping containers for radio isotopes and will have numerous other applications in the nuclear field.

Aluminum Roundup

Kaiser Aluminum & Chemical Corp. is expanding its aluminum plate facilities. Its 5-million-lb pull-plate-stretcher will be doubled in capacity and another 5-million-lb unit will be added. A total of $1.25 million will be spent in the expansion which will also add plate heat-treating facilities capable of handling 2 million lb of metal per month, numerous high speed cutting and shearing units and other plate-handling equipment.

Meanwhile, Reynolds Metals Co. is getting under way with an $11-million expansion program at its Listerhill, Ala., reduction plant. Capacity of the plant will be increased from 100 million lb to about 140 million lb of primary aluminum a year. Point of interest: Reynolds reports that its original estimate was for a 50 million lb increase at Listerhill, but that by supercharging pots, it has been able to increase production by some 10 million lb without adding to the physical facilities.

And Washington observers are looking for an announcement from the Office of Defense Mobilization which will order a stop to aluminum stockpiling—at least temporarily. This decision may mean that ODM has agreed with the recommendation of the interagency Materials Advisory Committee that fourth quarter aluminum stockpile shipments should be deferred to at least the second quarter of next year. Other reasons for taking a new look at aluminum stockpiling: 1. Industry expansion is changing stockpile requirements. 2. There is some indication that the problem of bauxite supply may be cured as a result of the work being done on clay. The ability to make alumina directly from clay would reduce the need for aluminum and bauxite in the stockpile.

Nickel Study Coming

Nickel is going to be studied again. Arthur S. Flemming, ODM director, will appoint a prominent person to study: 1. If the heavy pressure on nickel has come from a "gross underestimate" of requirements by the military. It is alleged that the military has failed to take into consideration the needs for nickel in spares and major components. 2. The base period on which International Nickel Co. is basing its allocations. 3. Reports indicating that there was an increase of some 54 per cent in the shipments of stainless steel (see page 173) during the first eight months of this year.

ODM is under extreme pressure to abandon the nickel stockpile. The military, forgers, etc., are all looking for more nickel to meet production requirements.

Market Memos

- Shipments of fold-up metal tubes totaled 744,557,328 units, surpassing the record of 733,773,312 units in the same 1953 period. The September total set a monthly record.
- October production of slab zinc set a new high of 89,462 tons. Total shipments were slightly under that figure, resulting in an increase in stocks, mostly in special high grade.

Total Zinc and Lead Consumption

(in tons)

	1955*	1954	Jan.-Aug. 1955	Jan.-Aug. 1954
Zinc	1,061,000	872,030	695,649	556,116
Lead	1,248,153	1,094,871	767,300	507,580

Source: U. S. Bureau of Mines
*STEEL, estimated

FARM IMPLEMENTS IN THE MAKING AT *Newport Steel*

Modern furnaces, rolling mills and other new facilities pour forth tons of steel to the most exacting specifications of individual implement manufacturers and others who prefer the quality, service and flexibility of the Newport operation. Here is an organization with 70 years background in fine steelmaking, personnel old in experience and young in outlook, new efficiency and greater accuracy in production control. Located right in the heart of America's greatest industrial growth, Newport is an exceptional source for the many important steel products listed here.

PRODUCTS OF NEWPORT STEEL

- Cold-Rolled Sheets
- Hot-Rolled Steel in Coil
- Hot-Rolled Pickled Steel in Coil
- Hot-Rolled Sheets
- Hot-Rolled Pickled Sheets
- Galvanized Sheets
- Galvannealed Sheets
- Colorbond Sheets
- Electrical Sheets
- Alloy Sheets and Plates
- Electric Weld Line Pipe
- Roofing and Siding
- Eave Trough and Conductor Pipe
- Culverts

ECONOMICAL WATERAIL-TRUCK DELIVERY

Newport Steel is ideally situated on the Mississippi-Ohio River system and the great Cincinnati rail-truck hub. New barge facilities, 7 major railroads, 143 motor carriers enable Newport to give economical, dependable delivery to the entire area of the Middle West and South.

Newport Steel
CORPORATION
NEWPORT, KENTUCKY

YOUR CONFIDENCE IS JUSTIFIED WHERE THIS FLAG FLIES

A SUBSIDIARY OF MERRITT-CHAPMAN & SCOTT CORPORATION

Nonferrous Metals

Cents per pound, carlots, except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots 24.40, pigs 22.50. 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 26.20; No. 43, 5% Si, 26.00; 142, 4% Cu, 1.5% Mg, 2% Ni, 28.20; No. 195, 4.5% Cu, 0.8% Si, 27.60; No. 214, 3.8% Mg, 27.80; No. 356, 7% Si, 0.3% Mg, 26.20.

Antimony: R.M.M. brand, 99.5%, 33.00, Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.50, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa., Elmore, O.

Beryllium Copper: 3.75-4.25% Be $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa. or Elmore, O.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb, deld.

Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 43.00 deld. Conn. Valley; 43.00 deld. Midwest; custom smelters, 45.00 deld.; Lake, 43.00 deld.; Fire refined, 42.75 deld.

Germanium: 99.9%, $295 per lb, nom.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $100-$120 nom, per troy oz.

Lead: Common, 15.30, chemical, 15.40, corroding, 15.40, St. Louis, New York basis, add 0.20.

Lithium: 99%+, cups, or ingot, $11.50; rod, $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: 99.8%, self-palletizing pig, 32.50; notched ingot, 33.25, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., add 1.40 for pig and 1.45 for ingot; for Madison, Ill., add 1.20 for pig and 1.25 for ingot; for Los Angeles, add 2.00 for both pig and ingot. Sticks 1.3 in. diameter, 53.00, 100 to 4999 lb, f.o.b. Madison, Ill.

Magnesium Alloys: AZ91C and alloys C, G, H and R, 36.00; alloy M, 38.00, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., add 1.40; for Madison, Ill., add 0.50; for Los Angeles, add 2.50.

Mercury: Open market, spot, New York, $280-$285 per 76-lb flask.

Molybdenum: Powder 99% hydrogen reduced, $3-$3.25 per lb; pressed ingot, $4.06 per lb; sintered ingot, $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 64.50; 10-lb pigs, unpacked, 67.65; "XX" nickel shot, 69.00; "F" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $80-$100, nom., per troy oz.

Palladium: $22-$24 per troy oz.

Platinum: $97-$105 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $118-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $9-$10 per lb.

Silver: Open market, 91.625 per troy oz.

Sodium: 16.50, c.l.; 17.00, l.c.l.

Tantalum: Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

Tellurium: $1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot 96.25; prompt, 96.125.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max), $3.75, grade A-2 (0.5% Fe max), $3.25 per pound.

Tungsten: Powder, 98.8%, carbon, reduced, 1000-lb lots, $4.50 per lb, nom., f.o.b. shipping point; less than 1000 lb add 15.00; 99+% hydrogen reduced, $4.65. Treated ingots, $6.70.

Zinc: Prime Western, 13.00; brass special, 13.25; intermediate, 13.50, East St. Louis, freight allowed over 0.50 per pound. High grade, 14.35; special high grade 14.50-14.75, deld. Diecasting alloy ingot No. 3, 17.50; No. 2, 18.50; No. 5, 18.00, deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, $10 per lb. Powder electronics grade, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 31.50-33.50; No. 12 foundry alloy (No. 2 grade) 30.50-30.75; 5% silicon alloy, 0.60 Cu max, 32.00-32.75; 13 alloy, 0.60 Cu max, 32.00-32.75; 195 alloy, 32.00-32.75; 108 alloy, 30.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 31.25-32.25; grade 2, 30.25-31.25; grade 3, 29.50-30.50; grade 4, 29.00-30.00.

Brass Ingot: Red brass No. 115, 41.00; tin bronze No. 225, 54.00; No. 245, 47.25; high-leaded tin bronze No. 305, 44.75; No. 1 yellow No. 405, 32.75; manganese bronze No. 421, 36.25.

Magnesium Alloy Ingot: AZ63A, 34.00; AZ91B, 34.00; AZ91C, 34.00; AZ92A, 34.00.

NONFERROUS MILL PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy) Strip, $1.84; rod, bar, wire, $1.81.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 100,000-lb lots, 48.35; 30,000-lb lots 48.88; l.c.l., 48.98. Weatherproof, 100,000-lb lots, 46.03; 30,000-lb lots, 46.28; l.c.l, 46.78. Magnetic wire deld., 15,000 lb or more, 55.52; l.c.l., 56.27.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21 per cwt; pipe, full coils, $21 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $14.00-$14.50; sheared mill plate, $11.00; strip, $14.00-$14.50; wire, $10.00-$10.50; forging billets, $8.75; hot-rolled and forged bars, $8.75.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 23.00; ribbon zinc in coils, 20 50; plates 19.50-22.25.

ZIRCONIUM

Plate, $22; H.R. strip, $19; C.R. strip, $29; forged or H.R. bars, $17; wire, 0.015 in., 1.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	102	83	99
Strip, C.R	102	92	125
Plate, H.R.	97	87	95
Rod, Shapes H.R. ..	87	74	93
Seamless Tubes	122	110	153
Shot, Blocks	...	71	...

ALUMINUM

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or	——Round——		—Hexagonal—	
across flats	2011-T3	2017-T4	2011-T3	2017-T4
Drawn				
0.125	67.9	66.4	...	...
0.156-0.172	57.5	55.9	...	...
0.188	57.5	55.9	...	71.7
0.219-0.234	54.5	52.9	...	...
0.250-0.281	54.5	52.9	...	68.4
0.313	54.5	52.9	...	65.2
Cold-finished				
0.375-0.547	53.4	51.4	63.7	61.3
0.563-0.688	53.4	51.4	60.6	57.5
0.750-1.000	52.1	50.1	55.4	54.2
1.063	52.1	50.1	...	52.3
1.125-1.500	50.1	48.2	53.6	52.3
Rolled				
1.563	48.8	46.9	...	...
1.625-2.000	48.2	46.2	...	50.5
2.125-2.500	47.0	45.0	...	...
2.563-3.375	45.6	43.6	...	...

ALUMINUM

Sheets and Circles: 1100 and 3003 mill finish (30,000 lb base; freight allowed)

Thickness Range Inches	Flat Sheet	Flat Sheet Circles*	Coiled Sheet	Coiled Sheet Circle†
0.249-0.136	37.5	42.3	...	...
0.135-0.096	38.0	43.2	...	...
0.095-0.077	38.7	44.2	36.1	41.3
0.076-0.061	39.3	45.1	36.3	41.5
0.060-0.048	39.9	45.6	36.7	42.0
0.047-0.038	40.4	46.5	37.2	42.4
0.037-0.030	40.8	47.0	37.6	43.1
0.029-0.024	41.4	47.5	37.9	43.6
0.023-0.019	42.2	49.0	38.8	44.5
0.018-0.017	43.0	...	39.4	45.4
0.016-0.015	43.9	...	40.2	46.6
0.014	44.9	...	41.2	47.9
0.013-0.012	46.1	...	41.9	48.9
0.011	47.1	...	43.1	50.5
0.010-0.0095	48.4	...	44.3	52.2
0.009-0.0085	49.7	...	45.8	54.3
0.008-0.0075	51.3	...	47.0	56.1
0.007	52.8	...	48.5	58.4
0.006	54.4	...	49.9	63.4

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*48 in. max diam. †26 in. max diam.

ALUMINUM

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam. 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	36.5	40.8
5050-F	37.6	41.9
3004-F	38.6	43.8
5052-F	39.9	45.2
6061-T6	41.1	46.0
2024-T4*	43.6	49.9
7075-T6*	51.4	58.5

---

*24-48 in. widths or diam, 72-180 in. lengths

ALUMINUM

Forging Stock: Round, Class 1, 39.10-50.10 in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 43.00-56.20 in random lengths, 0.375-4 in. thick, widths 0.750-10 in.

Pipe: ASA. Schedule 40, alloy 6063-T6, 20-ft lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$16 85	2	$ 51.95
1	26 50	4	143.00
1¼	35.85	6	256.70
1½	42.90	8	386.30

MAGNESIUM

Sheet: AZ31, commercial grade, 0.032 in., 99c; 0.064 in., 78.00c; 0.125 in., 63.50c, 30,000 lb and over, f.o.b. mill.

Plate: AZ31, 61.00c, 30,000 lb or more, 0.250 in. and over, widths 24-60 in., lengths 72-180 in.; tread plate, 64.00c, 30,000 lb or more, ¼-in. thick, widths 24-60 in., lengths 60-192 in.; tooling plate 66.00c, 30,000 lbs or more, .250-3.000 in., widths 60-72 in., lengths 72-180 in.

Extrusions: AZ31 commercial grade, rectangles, ¼ x 2 in., 64.70c; 1 x 4 in., 69.50c. Rod, 1 in., 61.50c; 2 in., 59.00c. Tubing, 1 in. OD x 0.065 in., 82.50c; Angles, 1 x 1 x ⅛-in., 68.40c; 2 x 2 x ¼-in., 62.50c. Channels, 5 in., 63.40c. I-beams, 5 in., 62.70c.

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 1100 clippings, 19.50; old sheets 16.50-18.00; borings and turnings, 11.00-11.50; crankcases, 16.50-18.00. Industrial castings 16.50-18.00.

Copper and Brass: No. 1 heavy copper and wire, 35.00-36.00; No. 2 heavy copper and wire, 34.00-34.50; light copper, 31.50-32.50; No. 1 composition red brass, 28.00-29.00; No. 1 composition turnings, 26.00-28.00; yellow

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	62.76b	60.36c	....	62.82	39.000	39.000	38.250
Yellow Brass	52.27	42.41d	52.81	55.18	28.875	28.625	26.750
Red Brass, 85%	58.09	58.03	58.63	60.90	34.250	34.000	33.500
Low Brass, 80%	56.55	56.49	57.09	59.36	32.750	32.250	31.750
Naval Brass	55.63	49.94	62.69	58.79	26.750	26.500	26.000
Com. Bronze, 90%	60.18	60.12	60.72	62.74	35.750	35.500	35.000
Nickel Silver, 10%	66.00	68.33g	68.33	....	32.500	32.250	16.250
Phos. Bronze, A, 5%	80.99	81.49	81.49	82.67	39.250	39.000	38.000
Silicon Bronze	66.54	65.73	66.58	68.68e	37.625	37.375	36.875
Manganese Bronze	59.37	53.38	63.82	....	27.000	26.750	25.750
Muntz Metal	53.74	49.55	....	....	27.000	26.750	26.250

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded.

brass turnings, 15.50-16.00; new brass clippings, 23.00-25.50; light brass, 15.50-17.50; heavy yellow brass, 17.50-20.00; new brass rod ends, 22.00-24.00; auto radiators, unsweated, 21.00-23.50; cocks and faucets, 23.00-23.50; brass pipe, 23.00-24.00.

Lead: Heavy, 12.00-12.50; battery plates, 6.50-6.75; linotype and stereotype, 13.25-14.25; electrotype, 12.00-12.75; mixed babbitt, 14.50.

Magnesium: Clippings, 18.50-19.50; clean castings, 18.00-19.00; iron castings, not over 10% removable Fe, less full deduction for Fe, 16.00-17.00.

Monel: Clippings, 54.50-60.00; old sheets, 45.00-50.00; turnings, 44.00; rods, 54.50-60.00.

Nickel: Sheets and clips, 90.00-125.00; rolled anodes, 90.00-125.00; turnings, 75.00-100.00; rod ends, 90.00-125.00.

Zinc: Old zinc, 5.50-6.00; new die-cast scrap, 5.00-5.75; old die-cast scrap; 3.25-3.50.

REFINER'S BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 22.50; 3003 clippings, 22.25-22.50; 6151 clipipngs, 22.00-22.50; 5052 clippings, 22.00-22.50; 2014 clippings, 21.50; 2017 clippings, 21.50; 2024 clippings, 21.50; mixed clippings, 21.50-22.00; old sheet, 19.00; old cast, 19.00-20.00; clean old cable (free of steel), 22.00-22.50; borings and turnings, 19.00-20.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 65.00; light scrap, 60.00; turnings and borings, 43.00-55.00.

Copper and Brass: No. 1 copper and wire, 39.00; No. 2 copper and wire, 37.50; light copper, 35.00-35.25; refinery brass (60% copper) per dry copper content, 35.50.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 copper and wire, 39.00; No. 2 copper and wire, 37.50; light copper, 35.00-35.25; No. 1 composition borings, 31.50; No. 1 composition solids, 32.00-32.50; heavy yellow brass solids 22.00; yellow brass turnings, 21.00; radiators, 24.50-25.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 59.42, oval, 58.92, 5000-10,000 lb; electrodeposited, 54.28, 2000-5000 lb lots; cast 62.54, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, $1.015; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb. All prices eastern delivery effective Jan. 1, 1955.

Tin: Bar or slab, less than 200 lb, $1.145; 200-499 lb, $1.13; 500-999 lb, $1.125; 1000 lb or more, $1.12.

Zinc: Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100-lb drums.

Chromic Acid: Less than 10,000 lb, 28.50; over 10,000 lb, 27.50.

Copper Cyanide: 100 lb, 85.25; 200 lb, 84.50; 300 lb, 84.25; 400-900 lb, 85.50; 1000 lb, 81.50.

Copper Sulphate: 500-1900 lb, 17.90; 2000-5900 lb, 15.90; 6000 lb or more, 15.65.

Nickel Chloride: 100 lb, 46.50; 200 lb, 44.50; 300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 39.50; 10,000 lb and over, 38.50. All prices eastern delivery, effective Jan. 1, 1955.

Nickel Sulphate: 100 lb, 38.25; 200 lb, 36.25; 3300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 31.25; 36,000 lb, 30.25. All prices eastern delivery, effective Jan. 1, 1955.

Silver Cyanide: (Cents per ounce) 4-oz bottle, 86.875; 16-oz bottle, 85.625; 80-oz bottle, 83.125; 100-oz bottle, 83.125; f.o.b. St. Louis, New York and Los Angeles. Effective Sept. 30, 1955.

Sodium Cyanide: Egg, under 1000 lb, 19.80; 1000-19,900 lb, 18.80; 20,000 lb and over, 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb, 72.50; 100-600 lb, 58.10; 700-1900 lb, 55.70; 2000-9900 lb, 53.90; 10,000 lb or more, 52.80.

Stannous Chloride (Anhydrous): Less than 50 lb, $1.588; 50 lb, $1.248; 100-300 lb, $1.098; 400-900 lb, $1.074; 1000-1900 lb, $1.049; 2000-4900 lb, $1.013; 5000-19,900 lb, 95.20; 20,000 lb or more, 89.10.

Stannous Sulphate: Less than 50 lb, $1.287; 50 lb, 98.70; 100-1900 lb, 96.70; 2000 lb or more, 94.70.

Zinc Cyanide: Under 1000 lb, 54.30; 1000 lb and over, 52.30.

MEMO
THE TORRINGTON COMPANY

☑ Faster Handling
☑ Greater Protection
☑ Reduced Costs

a manufacturer checks the benefits of STANLEY

STEEL STRAPPING

A change for the better . . . at the Torrington Company, Torrington, Conn., now that the Stanley "Uni-Tie" Steel Strapping System is used to help pack many millions of needle rollers each month for shipment to the auto industry. Formerly, the needle rollers were put in canvas bags. Four to six of these bags were then packed in a wooden box.

Now the needle bearings are packed in vacuum-sealed cans. Twenty cans are placed in cartons and "Uni-Tied" with Stanley Steel Strapping to an expendable pallet.

The Stanley method of "Uni-Tieing" on pallets means fewer packs. Handling and packing material costs are reduced. Handling and storage are easier . . . faster. The package reinforcement supplied by Stanley Steel Strapping assures maximum in-transit protection.

Is a change in *your* packing procedure called for? The Stanley Steel Strapping Specialist will analyze your methods and suggest improvements. Is POWER PACKING *your* requirement? Stanley has a complete line of steel strapping power and hand tools.

Mail coupon for catalog and to arrange an on-the-spot demonstration.

STANLEY INSURE IT — SECURE IT WITH STANLEY STEEL STRAPPING

STEEL STRAPPING DIVISION
THE STANLEY WORKS

STANLEY STEEL STRAPPING DIVISION, 105N-S LAKE ST., NEW BRITAIN, CONN.
Telephone: BAldwin 9-2021

☐ *Please send Catalog SS-9C.* ☐ *Please have Representative call.*

NAME ____________
POSITION ____________
COMPANY ____________
CO. ADDRESS ____________
CITY ____________ ZONE ______ STATE ______

Stanley Tools • Stanley Hardware • Stanley Electric Tools • Stanley Steel Strapping • Stanley Steel

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key on page 167. Key to footnotes, Page 169.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5	$65.50

INGOTS, Alloy (NT)

Detroit R7	$69.00
Houston S5	74.00
Midland,Pa. C18	69.00
Munhall,Pa. U5	69.00

BILLETS, BLOOMS & SLABS

Carbon, Rerolling (NT)

Aliquippa,Pa. J5	$68.50
Bessemer,Pa. U5	68.50
Bridgeport,Conn. N19	73.50
Buffalo R2	68.50
Clairton,Pa. U5	68.50
Ensley,Ala. T2	68.50
Fairfield,Ala. T2	68.50
Fontana,Calif. K1	76.00
Gary,Ind. U5	68.50
Johnstown,Pa. B2	68.50
Lackawanna,N.Y. B2	68.50
LoneStar,Tex. L6	74.50
Munhall, Pa. U5	68.50
Pittsburgh J5	68.50
S.Chicago,Ill. R2, U5	68.50
S.Duquesne,Pa. U5	68.50
Youngstown R2	68.50

Carbon, Forging (NT)

Aliquippa,Pa. J5	$84.50
Bessemer,Pa. U5	84.50
Bridgeport,Conn. N19	89.50
Buffalo R2	84.50
Canton,O. R2	86.50
Clairton,Pa. U5	84.50
Conshohocken,Pa. A3	89.50
Ensley,Ala. T2	84.50
Fairfield,Ala. T2	84.50
Fontana, Calif. K1	92.00
Gary,Ind. U5	84.50
Geneva,Utah C11	84.50
Houton S5	89.50
Johnstown,Pa. B2	84.50
Lackawanna,N.Y. B2	84.50
LosAngeles B3	94.00
Midland,Pa. C18	84.50
Munhall,Pa. U5	84.50
Pittsburgh J5	84.50
Seattle B3	98.00
S.Chicago R2,U5,W14	84.50
S.Duquesne,Pa. U5	84.50
S.SanFrancisco B3	94.00

Alloy, Forging (NT)

Bethlehem,Pa. B2	$96.00
Buffalo R2	96.00
Canton,O. R2, T7	96.00
Conshohocken,Pa. A3	103.00
Detroit R7	96.00
Fontana,Calif. K1	115.00
Gary,Ind. U5	96.00
Houston S5	101.00
Ind.Harbor,Ind. Y1	96.00
Johnstown,Pa. B2	96.00
Lackawanna,N.Y. B2	96.00
LosAngeles B3	116.00
Massillon,O. R2	96.00
Midland,Pa. C18	96.00
Munhall,Pa. U5	96.00
S.Chicago R2,U5,W14	96.00
S.Duquesne,Pa. U5	96.00
Struthers,O. Y1	96.00
Warren,O. C17	96.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2	$103.50
Canton,O. R2	103.50
Cleveland R2	103.50
Gary,Ind. U5	103.50
S.Chicago R2, W14	103.50
S.Duquesne,Pa. U5	103.50

SKELP

Aliquippa,Pa. J5	4.325
LoneStar,Tex. L6	4.625
Munhall,Pa. U5	4.225
SparrowsPoint,Md. B2	4.225
Warren,O. R2	4.225
Youngstown R2, U5	4.225

WIRE RODS

AlabamaCity,Ala. R2	5.025
Aliquippa,Pa. J5	5.025
Alton,Ill. L1	5.20
Buffalo B11, W12	5.025
Cleveland A7	5.025
Donora,Pa. A7	5.025
Fairfield,Ala. T2	5.025
Houston S5	5.275
IndianaHarbor,Ind. Y1	5.025
Johnstown,Pa. B2	5.025
Joliet,Ill. A7	5.025
KansasCity,Mo. S5	5.275
Kokomo,Ind. C16	5.125
LosAngeles B3	5.825
Minnequa,Colo. C10	5.275
Monessen,Pa. P7	5.025
N.Tonawanda,N.Y. B11	5.025
Pittsburg,Calif. C11	5.675
Portsmouth P12	5.025
Roebling,N.J. R5	5.125
S.Chicago,Ill. R2	5.025
SparrowsPoint,Md. B2	5.125
Sterling,Ill.(1) N15	5.025
Sterling,Ill. N15	5.125
Struthers,O. Y1	5.025
Worcester,Mass. A7	5.325

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2	4.60
Aliquippa,Pa. J5	4.60
Bessemer,Ala. T2	4.60
Bethlehem,Pa. B2	4.65
Birmingham C15	4.60
Clairton,Pa. U5	4.60
Fairfield,Ala. T2	4.60
Fontana,Calif. K1	5.25
Gary,Ind. U5	4.60
Geneva,Utah C11	4.60
Houston S5	4.70
Ind.Harbor,Ind. I-2	4.60
Johnstown,Pa. B2	4.65
KansasCity,Mo. S5	4.70
Lackawanna,N.Y. B2	4.65
LosAngeles B3	5.30
Minnequa,Colo. C10	4.90
Munhall,Pa. U5	4.60
Niles,Calif. P1	4.90
Portland,Oreg. O4	5.35
Phoenixville,Pa. P4	5.15
Seattle B3	5.35
S.Chicago U5, W14	4.60
S.SanFrancisco B3	5.25
Torrance,Calif. C11	5.30
Weirton,W.Va. W6	4.60

Wide Flange

Bethlehem,Pa. B2	4.65
Clairton,Pa. U5	4.60
Fontana,Calif. K1	5.40
Lackawanna,N.Y. B2	4.65
Munhall,Pa. U5	4.60
Phoenixville,Pa. P4	5.15
S.Chicago,Ill. U5	4.60

Alloy Std. Shapes

Clairton,Pa. U5	5.65
Fontana,Calif. K1	7.30
Gary,Ind. U5	5.65
Houton S5	5.75
Munhall,Pa. U5	5.65
S.Chicago,Ill. U5	5.65

H.S, L.A. Std. Shapes

Aliquippa,Pa. J5	6.75
Bessemer,Ala. T2	6.75
Bethlehem,Pa. B2	6.80
Clairton,Pa. U5	6.75
Fairfield,Ala. T2	6.75
Fontana,Calif. K1	7.40
Gary,Ind. U5	6.75
Geneva,Utah C11	6.75
Houston S5	6.85
Ind.Harbor,Ind. I-2, Y1	6.75
Johnstown,Pa. B2	6.80
KansasCity,Mo. S5	6.85
Lackawanna,N.Y. B2	6.80
LosAngeles B3	7.45
Munhall,Pa. U5	6.75
Seattle B3	7.50
S.Chicago,Ill. U5, W14	6.75
S.SanFrancisco B3	7.40
Struthers,O. Y1	6.75

H.S., L.A. Wide Flange

Bethlehem,Pa. B2	6.80
Lackawanna,N.Y. B2	6.80
Munhall,Pa. U5	6.75
S.Chicago,Ill. U5	6.75

PILING

BEARING PILES

Bethlehem,Pa. B2	4.65
Lackawanna,N.Y. B2	4.65
Munhall,Pa. U5	4.60
S.Chicago,Ill. U5	4.60

STEEL SHEET PILING

Ind.Harbor,Ind. I-2	5.45
Lackawanna,N.Y. B2	5.45
Munhall,Pa. U5	5.45
S.Chicago,Ill. U5	5.45

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2	4.50
Aliquippa,Pa. J5	4.50
Ashland,Ky.(15) A10	4.50
Bessemer,Ala. T2	4.50
Bridgeport,Conn. N19	4.75
Buffalo R2	4.50
Clairton,Pa. U5	4.50
Claymont,Del. C22	4.80
Cleveland J5, R2	4.60
Coatesville,Pa. L7	4.80
Conshohocken,Pa. A3	4.50
Detroit M1	4.60
Ecorse,Mich. G5	4.60
Fairfield,Ala. T2	4.50
Fontana,Calif.(30) K1	5.15
Gary,Ind. U5	4.50
Geneva,Utah C11	4.50
GraniteCity,Ill. G4	4.70
Harrisburg,Pa. P4	5.10
Houston S5	4.60
Ind.Harbor,Ind. I-2, Y1	4.50
Johnstown,Pa. B2	4.50
Lackawanna,N.Y. B2	4.50
LoneStar,Tex. L6	4.85
Mansfield,O. E6	4.50
Minnequa,Colo. C10	5.35
Munhall,Pa. U5	4.50
Newport,Ky. N9	4.50
Pittsburgh J5	4.50
Riverdale,Ill. A1	4.50
Seattle B3	5.40
Sharon,Pa. S3	4.50
S.Chicago R2, U5, W14	4.50
SparrowsPoint,Md. B2	4.50
Steubenville,O. W10	4.50
Warren,O. R2	4.50
Weirton,W.Va. W6	4.50
Youngstown R2, U5, Y1	4.50

PLATES, Carbon Abras. Resist.

Claymont,Del. C22	5.65
Fontana,Calif. K1	6.30
Geneva,Utah C11	5.65
Johnstown,Pa. B2	5.65
SparrowsPoint,Md. B2	5.65

PLATES, Wrought Iron

Economy,Pa. B14	10.40

PLATES,High-Strength Low-Alloy

Aliquippa,Pa. J5	6.725
Bessemer,Ala. T2	6.725
Clairton,Pa. U5	6.725
Cleveland J5, R2	6.725
Claymont,Del. C22	6.725
Coatesville,Pa. L7	6.725
Conshohocken,Pa. A3	6.725
Ecorse,Mich. G5	6.825
Fairfield,Ala. T2	6.725
Fontana,Calif.(30) K1	7.375
Gary,Ind. U5	6.725
Geneva,Utah C11	6.725
Houston S5	6.825
Ind.Harbor,Ind. I-2, Y1	6.725
Johnstown,Pa. B2	6.725
LosAngeles B3	7.625
Munhall,Pa. U5	6.725
Pittsburgh J5	6.725
Seattle B3	7.625
Sharon,Pa. S3	6.725
S.Chicago,Ill. U5, W14	6.725
SparrowsPoint,Md. B2	6.725
Youngstown U5, Y1	6.725

PLATES, Alloy

Bridgeport,Conn. N19	6.55
Claymont,Del. C22	6.30
Coatesville,Pa. L7	6.30
Fontana,Calif. K1	6.95
Gary,Ind. U5	6.30
Houston S5	6.40
Ind.Harbor,Ind. Y1	6.30
Johnstown,Pa. B2	6.30
Munhall,Pa. U5	6.30
Newport,Ky. N9	6.30
Seattle B3	7.20
Sharon,Pa. S3	6.30
S.Chicago,Ill. U5, W14	6.30
SparrowsPoint,Md. B2	6.30
Youngstown Y1	6.30

FLOOR PLATES

Cleveland J5	5.575
Conshohocken,Pa. A3	5.575
Harrisburg,Pa. P4	5.575
Ind.Harbor,Ind. I-2	5.575
Munhall,Pa. U5	5.575
S.Chicago,Ill. U5	5.575

PLATES, Ingot Iron

Ashland c.l. (15) A10	4.75
Ashland l.c.l. (15) A10	5.25
Cleveland c.l. R2	5.10
Warren,O. c.l. R2	5.10

BARS

BARS, Hot-Rolled Carbon

Ala.City,Ala. R2	4.65
Aliquippa,Pa. J5	4.65
Alton,Ill. L1	4.85
Atlanta A11	4.85
Bessemer,Ala. T2	4.65
Birmingham C15	4.65
Bridgeport,Conn. N19	4.80
Buffalo R2	4.65
Canton,O. R2	4.75
Clairton,Pa. U5	4.65
Cleveland R2	4.65
Ecorse,Mich. G5	4.75
Emeryville,Calif. J7	5.40
Fairfield,Ala. T2	4.65
FairlessHills,Pa. U5	4.80
Fontana,Calif. K1	5.35
Gary,Ind. U5	4.65
Houston S5	4.90
Ind.Harbor,Ind. I-2, Y1	4.65
Johnstown,Pa. B2	4.65
Joliet,Ill. P22	4.65
KansasCity,Mo. S5	4.90
Lackawanna,N.Y. B2	4.65
Los Angeles B3	5.35
Massillon,O. R2	4.75
Midland,Pa. C18	4.65
Milton,Pa. M18	4.65
Minnequa,Colo. C10	5.10
Niles,Calif. P1	5.00
N.Tonawanda,N.Y. B11	4.65
Pittsburg,Calif. C11	5.35
Pittsburgh J5	4.65
Portland,Oreg. O4	5.40
Seattle B3, N14	5.40
S.Chicago R2, U5, W14	4.65
S.Duquesne,Pa. U5	4.65
S.SanFran.,Calif. B3	5.40
Sterling,Ill.(1) N15	4.65
Sterling,Ill. N15	4.75
Struthers,O. Y1	4.65
Torrance,Calif. C11	5.35
Warren,O. R2	4.65
Weirton,W.Va. W6	4.65
Youngstown R2, U5	4.65

BARS, H.R. Leaded Alloy

Warren,O. C17	6.325

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2	5.575
Bridgeport,Conn. N19	5.725
Buffalo R2	5.575
Canton,O. R2, T7	5.575
Clairton,Pa. U5	5.575
Detroit R7	5.575
Ecorse,Mich. G5	5.675
Fontana,Calif. K1	6.625
FairlessHills,Pa. U5	5.725
Gary,Ind. U5	5.575
Houston S5	5.825
Ind.Harbor.Ind. I-2,Y1	5.575
Johnstown,Pa. B2	5.575
KansasCity,Mo. S5	5.825
Lackawanna,N.Y. B2	5.575
LosAngeles B3	6.625
Massillon,O. R2	5.575
Midland,Pa. C18	5.575
S.Chicago, R2, U5, W14	5.575
S.Duquesne,Pa. U5	5.575
Struthers,O. Y1	5.575
Warren,O. C17	5.575
Youngstown U5	5.575

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5	6.80
Bessemer,Ala. T2	6.80
Bethlehem,Pa. B2	6.80
Clairton,Pa. U5	6.80
Cleveland R2	6.80
Ecorse,Mich. G5	6.90
Fairfield,Ala. T2	6.80
Fontana,Calif. K1	7.50
Gary,Ind. U5	6.80
Houston S5	7.05
Ind.Harb.,Ind. I-2, Y1	6.80
Johnstown,Pa. B2	6.80
KansasCity,Mo. S5	7.05
Lackawanna,N.Y. B2	6.80
LosAngeles B3	7.50
Pittsburgh J5	6.80
Seattle B3	7.55
S.Chicago W14	6.80
S.Duquesne,Pa. U5	6.80
S.SanFrancisco B3	7.55
Struthers,O. Y1	6.80
Warren,O. R2	6.80
Youngstown U5	6.80

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa. B2	4.80

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5	4.65
Atlanta A11	4.85
Fontana,Calif. K1	5.35
Niles,Calif. P1	5.00
Pittsburgh J5	4.30
Portland,Oreg. O4	5.05
SanFrancisco S7	5.05

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5	5.65
Gary,Ind. U5	5.65
Houston S5	5.90
KansasCity,Mo. S5	5.90
Youngstown U5	5.65

BARS, C.F. Leaded Alloy

Ambridge,Pa. W18	8.325
Camden,N.J. P13	8.50
Chicago W18	8.325
Cleveland C20	8.325
Monaca,Pa. S17	8.325
Newark,N.J. W18	8.50
SpringCity,Pa. K3	8.50
Warren,O. C17	8.325

BARS, Cold-Finished Carbon

Ambridge,Pa. W18	5.90
BeaverFalls,Pa. M12, R2	5.90
Buffalo B5	5.95
Camden,N.J. P13	6.35
Carnegie,Pa. C12	5.90
Chicago W18	5.90
Cleveland A7, C20	5.90
Detroit R7	5.90
Detroit B5, P17	6.10
Donora,Pa. A7	5.90
Elyria,O. W18	5.90
FranklinPark,Ill. N5	5.90
Gary,Ind. R2	5.90
GreenBay,Wis. F7	5.90
Hammond,Ind. L2, M13	5.90
Hartford,Conn. R2	6.40
Harvey,Ill. B5	5.90
LosAngeles R2, S30	7.35
Mansfield,Mass. B5	6.45
Massillon,O. R2, R8	5.90
Midland,Pa. C18	5.90
Monaca,Pa. S17	5.90
Newark,N.J. W18	6.35
NewCastle,Pa.(17) B4	5.90
Pittsburgh J5	5.90
Plymouth,Mich. P5	6.15
Putnam,Conn. W18	6.45
Readville,Mass. C14	6.45
S.Chicago,Ill. W14	5.90
SpringCity,Pa. K3	6.35
Struthers,O. Y1	5.90
Waukegan,Ill. A7	5.90
Worcester,Mass. W19	6.35
Youngstown F3, Y1	5.90

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md. C19	5.15

BARS, Cold-Finished Alloy

Ambridge,Pa. W18	7.425
BearverFalls,Pa.M12,R2	7.425
Bethlehem,Pa. B2	7.425
Buffalo B5	7.425
Camden,N.J. P13	7.60
Canton,O. T7	7.425
Carnegie,Pa. C12	7.425
Chicago W18	7.425
Cleveland A7, C20	7.425
Detroit R7	7.425
Detroit B5, P17	7.625
Donora,Pa. A7	7.425
Elyria,O. W8	7.425
Gary,Ind. R2	7.425
GreenBay,Wis. F7	7.425
Hammond,Ind. L2, M13	7.425
Hartford,Conn. R2	7.725
Harvey,Ill. B5	7.425
Lackawanna,N.Y. B2	7.425
LosAngeles S30	9.10
Mansfield,Mass. B5	7.725
Massillon,O. R2, R8	7.425
Midland,Pa. C18	7.425
Monaca,Pa. S17	7.425
Newark,N.J. W18	7.60
Plymouth,Mich. P5	7.625
S.Chicago W14	7.425
SpringCity,Pa. K3	7.60
Struthers,O. Y1	7.425
Warren,O. C17	7.425
Waukegan,Ill. A7	7.425
Worcester,Mass. A7	7.725
Youngstown F3, Y1	7.425

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2	4.65
Atlanta A11	4.85
Birmingham C15	4.65
Buffalo R2	4.65
Cleveland R2	4.65
Ecorse,Mich. G5	4.75
Emeryville,Calif. J7	5.40
Fairfield,Ala. T2	4.65
FairlessHills,Pa. U5	4.80
Fontana,Calif. K1	5.35
Ft.Worth,Tex.(42) T4	5.10
Gary,Ind. U5	4.65
Houston S5	4.90

Ind.Harbor,Ind. I-2, Y1.4.65
Johnstown,Pa. B2 ......4.65
Joliet,Ill. P22 ....4.65
KansasCity,Mo. S5 ....4.90
Lackawanna,N.Y. B2 ..4.65
LosAngeles B3 ....5.35
Milton,Pa. M18 ....4.65
Minnequa,Colo. C10 ....5.10
Niles,Calif. P1 ....5.00
Pittsburg,Calif. C11 ....5.35
Pittsburgh J5 ....4.65
Portland,Oreg. O4 ......5.40
SandSprings,Okla. S5 ..5.15
Seattle B3, N14 ......5.40
S.Chicago R2 ....4.65
S.Duquesne,Pa. U5 ....4.65
S.SanFrancisco B3 ....5.40
SparrowsPoint,Md. B2 ..4.65
Sterling,Ill.(1) N15 ....4.65
Sterling,Ill. N15 ......4.75
Struthers,O. Y1 ....4.65
Torrance,Calif. C11 ....5.35
Youngstown R2, U5, Y1.4.65

BARS, Reinforcing (Fabricated; to Consumers)

Johnstown,Pa. ¼-1" B2.6.15
KansasCity,Kans. S5 ...6.45
Lackawanna,N.Y. B2 ..6.17
Marion,O. P11 ....5.90
Pittsburgh U8 ....6.17
Seattle B3, N14 ......6.60
SparrowsPt. ¼-1" B2..6.15
Williamsport,Pa. S19 ..6.00

RAIL STEEL BARS

Avis,Pa.(3) J8 ....4.25
ChicagoHts.(3) C2, I-2..4.55
ChicagoHts.(4) C2, I-2..4.65
Ft.Worth,Tex.(26) T4 ...5.10
Franklin,Pa.(3) F5 ....4.55
Franklin,Pa.(4) F5 ....4.65
Marion,O. (3) P11 .....4.50
Moline,Ill.(3) R2 ......4.65
Tonawanda(3) B12 ....4.50
Tonawanda(4) B12 ....4.65
Williamsport,Pa(3) S19.4.65

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 11.50
Economy,Pa.(D.R.)B14 14.30
Economy(Staybolt)B14 14.65
McK.Rks. (S.R.) L5 ..11.50
McK.Rks.(D.R.) L5 ...16.00
McK.Rks.(Staybolt) L5.17.00

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

Ala.City,Ala. R2 ......4.325
Allenport,Pa. P7 ......4.325
Ashland,Ky.(8) A10 ..4.325
Cleveland J5, R2 ......4.325
Conshohocken,Pa. A3 .4.375
Detroit(8) M1 ....4.425
Dravosburg,Pa. U5 ..4.325
Ecorse,Mich. G5 ......4.425
Fairfield,Ala. T2 ....4.325
FairlessHills,Pa. U5 ...4.375
Fontana,Calif. K1 ....5.075
Gary, Ind. U5 ....4.325
Geneva,Utah C11 ....4.425
GraniteCity,Ill. G4 ....4.525
Ind.Harbor,Ind. I-2, Y1.4.325
Kokomo,Ind. C16 ....4.425
Lackawanna,N.Y. B2 ..4.325
Mansfield,O. E6, (37)..4.325
Munhall,Pa. U5 ....4.325
Newport,Ky.(8) N9 ...4.325
Niles,O. N12 ....4.325
Pittsburg,Calif. C11...5.025
Pittsburgh J5 ....4.325
Portsmouth,O. P12 ....4.325
Riverdale,Ill. A1 ....4.325
Sharon,Pa. S3 ....4.325
S.Chicago,Ill. W14 ....4.325
SparrowsPoint,Md. B2.4.325
Steubenville,O. W10 ...4.325
Warren,O. R2 ....4.325
Weirton,W.Va. W6 ..4.325
Youngstown U5, Y1 ..4.325

SHEETS, H.R. (19 Ga. & Lighter)

Ala.City,Ala. R2 ......5.625
Kokomo,Ind. C16 ....5.475
Niles,O. N12 ....5.325

SHEETS, H.R. Alloy

Ind.Harbor,Ind. Y1 ....7.20
Youngstown Y1 ....7.20

SHEETS, H.R. (14 Ga. & Heavier) High-Strength Low-Alloy

Cleveland J5, R2 ....6.375
Conshohocken,Pa. A3 ..6.425
Dravosburg,Pa. U5 ....6.375
Ecorse,Mich. G5 ......6.475
Fairfield,Ala. T2 ....6.375
FairlessHills,Pa. U5 ...6.425
Fontana,Calif. K1 ....7.125
Gary,Ind. U5 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.375
Lackawanna(35) B2 ..6.375
Munhall,Pa. U5 ......6.375
Pittsburgh J5 ....6.375
Sharon,Pa. S3 ....6.375
S.Chicago,Ill. U5 ......6.375
SparrowsPoint(36) B2..6.375
Warren,O. R2 ....6.375
Weirton,W.Va. W6 ....6.375
Youngstown U5, Y1....6.375

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky. (8) A10 ..4.575
Ind.Harbor,Ind. I-2 ...4.575

SHEETS, Cold-Rolled Steel (Commercial Quality)

Allenport,Pa. P7 ......5.325
Cleveland J5, R2 ....5.325
Conshohocken,Pa. A3 ..5.375
Dravosburg,Pa. U5 ....5.325
Detroit M1 ....5.325
Ecorse,Mich. G5 ......5.425
Fairfield,Ala. T2 ......5.325
FairlessHills,Pa. U5 ..5.375
Follansbee,W.Va. F4 ..5.325
Fontana,Calif. K1 ....6.425
Gary,Ind. U5 ....5.325
GraniteCity,Ill. G4 ....5.525
Ind.Harbor,Ind I-2, Y1 5.325
Lackawanna,N.Y. B2..5.325
Mansfield,O. E6 ......5.325
Middletown,O. A10 ......5.325
Newport,Ky. N9 ......5.325
Pittsburg,Calif. C11 ..6.275
Pittsburgh J5 ....5.325
Portsmouth,O. P12 ....5.325
SparrowsPoint,Md. B2..5.325
Steubenville,O. W10 ...5.325
Warren,O. R2 ....5.325
Weirton,W.Va. W6 ......5.325
Youngstown Y1 ......5.325

SHEETS, Cold-Rolled High-Strength Low-Alloy

Cleveland J5, R2 ......7.875
Dravosburg,Pa. U5 ....7.875
Ecorse,Mich. G5 ......7.975
FairlessHills,Pa. U5 ...7.925
Fontana,Calif. K1 ......8.975
Gary,Ind. U5 ....7.875
IndianaHarbor,Ind. Y1.7.875
Lackawanna(37) B2 ..7.875
Pittsburgh J5 ....7.875
SparrowsPoint(38) B2.7.875
Warren,O. R2 ....7.875
Weirton,W.Va. W6 ....7.875
Youngstown Y1 ......7.875

SHEETS, Cold-Rolled Ingot Iron

Middletown,O. A10 ....5.825

SHEETS, Culvert (16 Gage)	Cu Alloy	Cu Fe
Ashland,Ky. A10	6.90	...
Canton,O. R2	6.10	6.55
Dravosburg U5 ..	6.10	...
Fairfield T2	6.10	...
Gary,Ind. U5	6.10	6.35
Ind.Harbor I-2 ..	6.10	6.35
Kokomo,Ind. C16	6.20	...
MartinsFry. W10	6.10	...
Newport,Ky. N9..	6.10	6.35
Pitts.,Calif. C11..	6.85	...
SparrowsPt. B2 ..	6.10	...

SHEETS, Culvert—Pure Iron

Ashland,Ky. A10 ......7.15
Gary,Ind. U5 ....6.35
MartinsFry,O. W10 ....6.35

SHEETS, Galvanized Steel Hot-Dipped

Ala.City,Ala. R2 .....5.85‡
Ashland,Ky. A10 .....5.85†
Canton,O. R2 ....5.85‡
Delphos,O. N16 ....6.60‡
Dover,O. R1 ....5.85‡
Dravosburg,Pa. U5 ...5.85†
Fairfield,Ala. T2 .....5.85†
Gary,Ind. U5 ....5.85*
GraniteCity,Ill. G4 ....6.05
Ind.Harbor,Ind. I-2 ...5.85†
Kokomo,Ind. C16 .....5.95‡
MartinsFerry,O. W10 ..5.85*
Middletown,O. A10 ....5.85†
Newport,Ky. N9 ......5.85‡
Niles,O. N12 ....6.85‡
Pittsburg,Calif. C1 ....6.60*
SparrowsPt.,Md. B2 ..5.85†
Steubenville,O. W10 ...5.85‡
Warren,O. R2 ....5.85†
Weirton,W.Va. W6 ....5.85*

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*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 ....6.575

SHEETS, Galvanized High-Strength Low-Alloy

Dravosburg,Pa. U5 ....8.60
SparrowsPoint(39) B2 ..8.60

SHEETS, Galvannealed Steel

Canton,O. R2 ....6.25
Dravosburg,Pa. U5 ....6.25
Kokomo,Ind. C16 ......6.60
Newport,Ky. N9 ....6.25
Niles,O. N12 ....7.25

SHEETS, Galvanized Ingot Iron (Hot-dipped Continuous)

Ashland,Ky. A10 .....6.10
Middletown,O. A10 ....6.10

SHEETS, Electrogalvanized

Cleveland(28) R2 .....6.70
Niles,O.(28) R2 ......6.70
Weirton,W.Va. W6 ....6.55

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1).8.50
Butler,Pa. A10 (type 2).8.60

SHEETS, Enameling Iron

Ashland,Ky. A10 ......5.90
Cleveland R2 ....5.90
Dravosburg,Pa. U5 ....5.90
Gary,Ind. U5 ....5.90
GraniteCity,Ill. G4 .....6.10
Ind.Harbor,Ind. I-2 ....5.90
Middletown,O. A10 ....5.90
Niles,O. N12 ....5.90
Youngstown Y1 ....5.90

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ...7.75
Ind.Harbor,Ind. I-2 ....7.75
Yorkville,O. W10 ......7.75

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va. W10 6.25
Gary,Ind. U5 ....6.25
Mansfield,O. E6 ....6.25
Middletown,O. A10 ....6.25
Niles,O. N12 ....6.25
Weirton,W.Va. W6 .....6.25

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 .....6.65

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Division H. K. Porter Co. Inc.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel Div., Sharon Steel Corp.
D4 Disston & Sons, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine & Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman&Scott

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb.Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N12 Niles Rolling Mill Div. Sharon Steel Corp.
N14 Northwest.SteelRoll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel &Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div. U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Division, H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	4.325
Allenport,Pa. P7	4.325
Alton,Ill. L1	4.50
Ashland,Ky.(8) A10	4.325
Atlanta A11	4.525
Bessemer,Ala. T2	4.325
Birmingham C15	4.325
Bridgeport,Conn. N19	4.625
Buffalo(27) R2	4.325
Conshohocken,Pa. A3	4.375
Detroit M1	4.425
Ecorse,Mich. G5	4.425
Fairfield,Ala. T2	4.325
Fontana,Calif. K1	5.075
Gary,Ind. U5	4.325
Ind.Harbor,Ind. I-2, Y1	4.325
Johnstown,Pa.(25) B2	4.325
Lackaw'na,N.Y.(24) B2	4.325
LosAngeles(25) B3	5.075
Milton,Pa. M18	4.325
Minnequa,Colo. C10	5.425
NewBritain(10) S15	4.325
N.Tonawanda,N.Y. B11	4.325
Pittsburg,Calif. C11	5.075
Portsmouth,O. P12	4.325
Riverdale,Ill. A1	4.325
SanFrancisco S7	5.05
Seattle(25) B3	5.325
Seattle N14	5.40
Sharon,Pa. S3	4.325
S.Chicago, Ill. W14	4.325
S.SanFrancisco(25) B3	5.075
SparrowsPoint,Md. B2	4.325
Sterling(1) N15	4.325
Sterling,Ill. N15	4.425
Torrance,Calif. C11	5.075
Warren,O. R2	4.325
Weirton W.Va. W6	4.325
Youngstown U5	4.325

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19	7.50
Carnegie,Pa. S18	7.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	7.20
Ind.Harbor,Ind. Y1	7.20
LosAngeles B3	8.40
Newport,Ky. N9	7.20
Sharon, Pa. S3	7.20
S.Chicago W14	7.20
Youngstown U5, Y1	7.20

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2	6.425
Conshohocken,Pa. A3	6.425
Ecorse,Mich. G5	6.525
Fairfield,Ala. T2	6.425
Fontana,Calif. K1	7.525
Gary,Ind. U5	6.425
Houston S5	6.675
Ind.Harbor,Ind. I-2, Y1	6.425
KansasCity,Mo. S5	6.675
Lackawanna,N.Y. B2	6.425
LosAngeles(25) B3	7.175
Seattle(25) B3	7.425
Sharon,Pa. S3	6.425
S.SanFrancisco(25) B3	7.175
SparrowsPoint,Md. B2	6.425
Warren,O. R2	6.425
Weirton,W.Va. W6	6.425
Youngstown U5, Y1	6.425

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	4.575

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	6.25
Baltimore T6	6.25
Boston T6	6.80
Buffalo S40	6.25
Cleveland J5	6.25
Cleveland A7	6.25
Conshohocken,Pa. A3	6.30
Dearborn,Mich. D3	6.35
Detroit D2, M1, P20	6.35
Dover,O. G6	6.25
Ecorse,Mich. G5	6.35
Follansbee,W.Va. F4	6.25
Fontana,Calif. K1	8.00
Franklin Park,Ill. T6	6.35
Ind.Harbor,Ind. I-2	6.35
Ind.Harbor,Ind. Y1	6.25
Indianapolis C8	6.40
Lackawanna,N.Y. B2	6.25
LosAngeles C1	8.50
NewBedford,Mass. R10	6.70
NewBritain(10) S15	6.25
NewCastle,Pa. B4, E5	6.25
NewHaven,Conn. A7	7.00
NewHaven,Conn. D2	6.70
NewKensington,Pa. A6	6.25
Pawtucket,R.I. R3	6.90
Pawtucket,R.I. N8	6.80
Pittsburgh J5	6.25
Portsmouth,O. P12	6.25
Riverdale,Ill. A1	6.35
Rome,N.Y. (32) R6	6.25
Sharon,Pa. S3	6.25
SparrowsPt.,Md. B2	6.25
Trenton,N.J.(31) R5	7.80
Wallingford,Conn. W2	6.70
Warren,O. R2, T5	6.25
Weirton,W.Va W6	6.25
Worcester,Mass. A7	7.10
Youngstown Y1	6.25
Youngstown C8	6.25

STRIP, Cold-Rolled Alloy

Boston T6	13.80
Carnegie,Pa. S18	13.45
Cleveland A7	13.45
Dover,O. G6	13.45
FranklinPark,Ill. T6	13.45
Harrison,N.J. C18	13.45
Indianapolis C8	13.60
Pawtucket,R.I. N8	13.80
Sharon,Pa. S3	13.45
Worcester,Mass. A7	13.75
Youngstown C8	13.45

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland A7	9.10
Dearborn,Mich. D3	9.20
Dover,O. G6	9.30
Ecorse,Mich. G5	9.20
Ind.Harbor,Ind. Y1	9.30
Lackawanna,N.Y. B2	9.10
Sharon,Pa. S3	9.10
SparrowsPoint,Md. B2	9.10
Warren,O. R2	9.10
Weirton,W.Va. W6	9.10
Youngstown Y1	9.30

STRIP, Electrogalvanized

Cleveland A7	6.25*
Dover,O. G6	6.25*
Riverdale,Ill. A1	6.55*
Youngstown C8	6.25*
Warren,O. T5	6.25*
Warren,O. B9	6.45*
Weirton,W.Va. W6	5.75*
Worcester,Mass. A7	7.10*

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*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3	6.55

TIGHT COOPERAGE HOOP

Atlanta A11	5.05
Riverdale,Ill. A1	4.90
Sharon,Pa. S3	4.75
Youngstown U5	4.75

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	7.30	9.25	10.80	12.95	15.65
Boston T6	7.55	9.25	10.80	12.95	15.65
Bristol,Conn. W1	...	...	10.80	12.95	15.65
Carnegie, Pa. S18	...	8.95	10.50	12.65	....
Cleveland A7	7.00	8.95	10.50	12.65	15.35
Cleveland C7	...	8.95	10.50	12.65	15.35
Dearborn,Mich. D3	7.10	9.05	10.60	....	....
Detroit D2	7.10	9.05	10.60	12.75	....
Dover,O. G6	7.00	8.95	10.50	12.65	15.35
Follansbee,W.Va. F4	7.00	8.95	10.50**	....	....
FranklinPark,Ill. T6	7.10	8.95	10.50	12.65	15.35
Harrison,N.J. C18	...	...	10.80	12.95	15.65
Indianapolis C8	7.15	9.10	10.50	12.65	15.35
NewBritain,Conn.(10) S15	7.00	8.95	10.50	12.65	15.35
NewCastle,Pa. B4, E5	7.00	8.95	10.50	12.65	....
NewHaven,Conn. D2	7.45	9.25	10.80	12.95	....
NewKensington,Pa. A6	7.00	8.95	10.50	....	....
New York W3	...	9.25	10.80	12.95	15.65
Pawtucket,R.I. N8	7.55	9.25	10.80	12.95	15.35
Riverdale,Ill. A1	7.10	8.95	10.50	12.65	15.35
Rome,N.Y.(32) R6	7.00	8.95	10.50	12.65	15.35
Sharon,Pa. S3	7.00	8.95	10.50	12.65	15.35
Trenton,N.J. R5	...	9.25	10.80	12.95	15.65
Wallingford,Conn. W2	7.45	9.25	10.80	12.95	15.65
Warren,O. T5	7.00	8.95	10.50	12.65	15.35
Weirton,W.Va. W6	7.00	8.95	10.50	12.65	15.35
Worcester,Mass. T6	7.55	9.25	10.80	12.95	15.65
Worcester,Mass. A7	7.85	9.25	10.80	12.95	15.65
Youngstown C8	7.00	8.95	10.50	12.65	15.35

**0.065 C, max.

Spring Steel (Tempered)					
Bristol,Conn. W1	...	...	14.40	17.60	....
Buffalo, W12	...	...	14.40	....	....
FranklinPark,Ill. T6	...	...	14.90	18.10	21.50
Harrison,N.J. C18	...	...	14.40	17.60	21.00
NewYork W3	...	...	14.40	17.60	21.00
Trenton,N.J. R5	...	...	14.40	17.60	21.00
Worcester,Mass. A7, T6	...	...	14.40	17.60	21.00
Worcester,Mass. W12	...	...	14.40	....	....
Youngstown C8	...	...	14.75	17.95	21.35

SILICON STEEL

H.R. SHEETS(22 Ga.,cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	...	...	9.95	10.95	11.85
Brackenridge,Pa. A4	...	...	9.95	10.95	11.85
Mansfield,O. E6	8.40	9.35	9.95	10.95	11.85
Newport,Ky. N9	8.40	9.35	9.95	10.95	11.85
Niles,O. N12	8.40	9.35	9.95	10.95	....
Vandergrift,Pa. U5	...	9.35	9.95	10.95	11.85
Warren,O. R2	8.40	9.35	9.95	10.95	11.85
Zanesville,O. A10	...	9.35	9.95	10.95	11.85

C.R. COILS & CUT LENGTHS, (22 Ga.) Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	...	...	10.70	11.70	12.60
GraniteCity,Ill. G4	8.80*	9.80*	10.40*	11.40*	....
IndianaHarbor,Ind. I-2	8.60†	9.60*	10.20*	11.20*	....
Vandergrift,Pa. U5	...	10.10†	10.70†	11.70†	12.60†
Vandergrift,Pa. U5	8.60*	9.60*	10.20*	11.20*	12.10*
Warren,O. R2	8.60†	10.10	10.70	11.70	12.60
Zanesville,O. A10	...	10.10	10.70	11.70	12.60

	Transformer Grade			
H.R. SHEETS (22 Ga., cut lengths)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	12.80	13.35	13.85	14.85
Brackenridge,Pa. A4	12.80	....	....	....
Newport,Ky. N9	12.80	....	....	....
Vandergrift,Pa. U5	12.80	13.35	13.85	14.85
Zanesville,O. A10	12.80§	13.35§	13.85§	14.85§

	Grain Oriented				
C.R. COILS & CUT LENGTHS (22 Ga.)	T-100	T-90	T-80	T-73	T-72
Brackenridge,Pa. A4	....	15.85	17.45	17.95	13.55§
Butler,Pa. A10	...	....	17.45	17.95	....
Vandergrift,Pa. U5	14.85	15.85	17.45	17.95	13.55
Warren,O. R2	....	....	....	....	13.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. §Coils, ¾-cent higher.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.90	$8.15	$8.55
Dravosburg, Pa. U5	7.90	8.15	8.55
Fairfield,Ala. T2	8.00	8.25	8.65
FairlessHills,Pa. U5	8.00	8.25	8.65
Gary,Ind. U5	7.90	8.15	8.55
GraniteCity,Ill. G4	8.00	8.25	8.65
IndianaHarbor,Ind. I-2, Y1	7.90	8.15	8.55
Niles,O. R2	7.90	8.15	8.55
Pittsburg,Calif. C11	8.65	8.90	9.30
SparrowsPoint,Md. B2	8.00	8.25	8.65
Weirton,W.Va. W6	7.90	8.15	8.55
Yorkville,O. W10	7.90	8.15	8.55

ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	6.575	....	....
Niles,O. R2	7.075	7.275	7.475

TINPLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$9.20	$9.45
Dravosburg,Pa. U5	9.20	9.45
Fairfield,Ala. T2	9.30	9.55
Fairless,Pa. U5	9.30	9.55
Gary,Ind. U5	9.20	9.45
Ind.Har. I-2, Y1	9.20	9.45
Pitts.,Calif. C11	9.95	10.20
Sp.Pt.,Md. B2	9.30	9.55
Weirton,W.Va. W6	9.20	9.45
Yorkville,O. W10	9.20	9.45

BLACK PLATE, (Base Box)

Aliquippa,Pa. J5	$7.00
Dravosburg,Pa. U5	7.00
Fairfield,Ala. T2	7.10
FairlessHills,Pa. U5	7.10
Gary,Ind. U5	7.00
GraniteCity,Ill. G4	7.10
Ind.Harbor,Ind. I-2, Y1	7.00
Niles,O. R2	7.00
Pittsburg,Calif. C11	7.75
SparrowsPoint,Md. B2	7.10
Warren,O. R2	7.00
Weirton,W.Va. W6	7.00
Yorkville,O. W10	7.00

HOLLOWARE ENAMELING Black Plate (29 Gage)

Dravosburg,Pa. U5	6.65
Gary,Ind. U5	6.65
GraniteCity,Ill. G4	6.75
Ind.Harbor,Ind. Y1	6.65
Yorkville,O. W10	6.65

MANUFACTURING TERNES (Special Coated; Base Box)

Dravosburg,Pa. U5	$8.70
Gary,Ind. U5	8.70

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville,O. W10	$9.15

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary,Ind. U5	$10.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	6.25
Aliquippa,Pa. J5	6.25
Alton,Ill. L1	6.425
Atlanta A11	6.45
Bartonville,Ill. K4	6.35
Buffalo W12	6.25
Chicago W13	6.25
Cleveland A7	6.25
Crawfordsville,Ind. M8	6.35
Donora,Pa. A7	6.25
Duluth,Minn. A7	6.25
Fairfield,Ala. T2	6.25
Fostoria,O.(24) S1	6.45
Houston S5	6.50
Jacksonville,Fla. M8	6.77
Johnstown,Pa. B2	6.25
Joliet,Ill. A7	6.25
KansasCity,Mo. S5	6.50
Kokomo,Ind. C16	6.35
LosAngeles B3	7.20
Minnequa,Colo. C10	6.50
Monessen,Pa. P7	6.25
Newark 6-8 ga. I-1	6.90
N. Tonawanda B11	6.25
Palmer,Mass. W12	6.55
Pittsburg,Calif. C11	7.20
Portsmouth,O. P12	6.25
Rankin,Pa. A7	6.25
S.Chicago,Ill. R2	6.25
S.SanFrancisco C10	7.20
SparrowsPoint,Md. B2	6.35
Sterling,Ill.(1) N15	6.25
Sterling,Ill. N15	6.35
Struthers,O. Y1	6.25
Waukegan,Ill. A7	6.25
Worcester,Mass. A7	6.55

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	7.90
Alton,Ill. L1	8.075
Bartonville,Ill. K4	8.00
Buffalo W12	7.90
Cleveland A7	7.90
Donora,Pa. A7	7.90
Duluth,Minn. A7	7.90
Fostoria,O. S1	7.95
Johnstown,Pa. B2	7.90
LosAngeles B3	8.85
Milbury,Mass.(12) N6	8.20
Minnequa,Colo. C10	8.15
Monessen,Pa. P16	7.90
Muncie,Ind. I-7	8.10
Palmer,Mass. W12	8.20
Pittsburg,Calif. C11	8.85
Portsmouth,O. P12	7.90
Roebling,N.J. R5	8.20
S.Chicago,Ill. R2	7.90
S.SanFrancisco C10	8.85
SparrowsPt.,Md. B2	8.00
Struthers,O. Y1	7.90
Trenton,N.J. A7	8.20
Waukegan,Ill. A7	7.90
Worcester A7,J4,T6,W12	8.20

WIRE, Upholstery Spring

Aliquippa,Pa. J5	7.60
Alton,Ill. L1	7.775
Buffalo W12	7.60
Cleveland A7	7.60
Donora,Pa. A7	7.60
Duluth,Minn. A7	7.60
Johnstown,Pa. B2	7.60
KansasCity,Mo. S5	7.85
LosAngeles B3	8.55
Minnequa,Colo. C10	7.775
Monessen,Pa. P16	7.60
NewHaven,Conn. A7	7.90
Palmer,Mass. W12	7.90
Pittsburg,Calif. C11	8.55
Portsmouth,O. P12	7.60
Roebling,N.J. R5	7.90
S.Chicago,Ill. R2	7.60
S.SanFrancisco C10	8.55
SparrowsPoint,Md. B2	7.70
Struthers,O. Y1	7.60
Trenton,N.J. A7	7.90
Waukegan,Ill A7	7.60
Worcester,Mass. A7	7.90

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	12.725
Bartonville,Ill. K4	12.65
Buffalo W12	12.55
Chicago W13	12.55
Cleveland A7	12.55
Crawfordsville,Ind. M8	12.65
Fostoria,O. S1	12.55
Jacksonville,Fla. M8	13.08
Johnstown,Pa. B2	12.55
Kokomo,Ind. C16	12.55
Minnequa,Colo. C10	12.30
Monessen,Pa. P16	12.55
Muncie,Ind. I-7	12.75
Palmer,Mass. W12	12.85
Roebling,N.J. R5	12.85
S.SanFrancisco C10	12.90
Waukegan,Ill. A7	12.55
Worcester,Mass.A7,T6	12.85

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4	10.70
Buffalo W12	10.70
Johnstown,Pa. B2	10.70
Minnequa,Colo. C10	10.825
Monessen,Pa. P16	10.70
Muncie,Ind. I-7	10.90
Pittsburg,Calif. C11	11.50
Portsmouth,O. P12	10.70
Roebling,N.J. R5	11.00
SparrowsPt., Md. B2	10.80

ROPE WIRE	(A)
Bartonville,Ill. K4	10.55
Buffalo W12	10.55
Fostoria,O.(23) S1	10.55
Johnstown,Pa. B2	10.55
Monessen,Pa. P16	10.55
Muncie,Ind. I-7	10.75
Palmer,Mass. W12	10.85
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.85
SparrowsPt. B2	10.65
Struther,O. Y1	10.55
Worcester,Mass. J4	10.85

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE
(Continued)

WIRE, Tire Bead

Bartonville, Ill. K4	14.15
Monessen, Pa. P16	14.20
Roebling,N.J. R5	14.35

WIRE, Cold-Rolled Flat

Anderson Ind. G6	9.00
Baltimore T6	9.30
Buffalo W12	9.00
Cleveland A7	9.00
Crawfordsville,Ind. M8	9.00
Dover,O. G6	9.00
Fostoria,O. S1	9.00
FranklinPark,Ill. T6	9.10
Kokomo,Ind. C16	9.00
Massillon,O. R8	9.00
Milwaukee C23	9.20
Monessen,Pa. P16	9.00
Pawtucket,R.I. N8	9.30
Riverdale,Ill. A1	9.10
Rome,N.Y. R6	9.00
Trenton,N.J. R5	9.30
Worcester A7, T6, W12	9.30

NAIL, Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala. R2	152
Aliquippa,Pa. J5	152
Atlanta A11	154
Bartonville,Ill. K4	154
Chicago,Ill. W13	152
Cleveland A9	157
Crawfordsville,Ind. M8	154
Donora,Pa. A7	152
Duluth, Minn. A7	152
Fairfield,Ala. T2	152
Galveston,Tex. D7	157
Houston,Tex. S5	157
Johnstown,Pa. B2	152
Joliet,Ill. A7	152
KansasCity,Mo. S5	157
Kokomo,Ind. C16	154
Minnequa,Colo. C10	157
Monessen,Pa. P7	152
Pittsburg,Calif. C11	171
Rankin,Pa. A7	152
S.Chicago,Ill. R2	152
SparrowsPt.,Md. B2	154
Sterling,Ill. (1) N15	152
Worcester,Mass. A7	158

NAILS, CUT (100 lb keg)

To Dealers (33)	
Conshohocken,Pa. A3	$9.05
Wheeling,W.Va. W10	9.05

STAPLES, Polished Stock

To Dealers & Mfrs. (7)	Col.
Aliquippa,Pa. J5	152
Atlanta A11	154
Bartonville,Ill. K4	154
Crawfordsville,Ind. M8	154
Donora,Pa. A7	152
Duluth,Minn. A7	152
Fairfield,Ala. T2	152
Johnstown,Pa. B2	152
Joliet,Ill. A7	152
Kokomo,Ind. C16	154
Minnequa,Colo. C10	157
Monessen,Pa. P7	152
Pittsburg,Calif. C11	171
Rankin,Pa. A2	152
SparrowsPt.,Md. B2	154
Sterling,Ill.(1) N15	152
Worcester,Mass. A7	158

TIE WIRE, Automatic Baler (14½ Ga.) (Per 97 lb Net Box)

Coil No. 3150	
AlabamaCity,Ala. R2	$9.35
Bartonville,Ill. K4	9.45
Buffalo W12	9.35
Crawfordsville,Ind. M8	9.46
Donora,Pa. A7	9.35
Duluth,Minn. A7	9.35
Johnstown,Pa. B2	9.35
Joliet,Ill. A7	9.35
Kokomo,Ind. C16	9.45
LosAngeles B3	10.14
Minnequa,Colo. C10	9.60
Pittsburg,Calif. C11	10.43
S.Chicago,Ill. R2	9.35
SparrowsPt.,Md. B2	9.45
Sterling,Ill. N15	9.35

Coil No. 6500 Stand.	
AlabamaCity,Ala. R2	$9.65
Bartonville,Ill. K4	9.75
Buffalo W12	9.60
Crawfordsville,Ind. M8	9.75
Donora,Pa. A7	9.65
Duluth,Minn. A7	9.65
Johnstown,Pa. B3	9.65
Joliet,Ill. A7	9.65
Kokomo,Ind. C16	9.75
LosAngeles B3	10.45
Minnequa,Colo. C10	9.90
Pittsburg,Calif. C11	10.13
S.Chicago,Ill. R2	9.65
SparrowsPt.,Md. B2	9.75
Sterling,Ill. N15	9.65

Coil No. 6500 Interim	
AlabamaCity,Ala. R2	$9.70
Bartonville,Ill. K4	9.80
Buffalo W12	9.70
Crawfordsville,Ind. M8	9.80
Donora,Pa. A7	9.70
Duluth,Minn. A7	9.70
Johnstown,Pa. B2	9.70
Joliet,Ill. A7	9.70
Kokomo,Ind. C16	9.80
LosAngeles B3	10.50
Minnequa,Colo. C10	9.95
Pittsburg,Calif. C11	10.50
S.Chicago,Ill. R2	9.70
SparrowsPt.,Md. B2	9.80
Sterling,Ill. N15	9.70

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	175**
Aliquippa J5	172§
Atlanta A11	181
Bartonville,Ill. K4	181
Crawfordsville,Ind. M8	181
Donora,Pa. A7	175†
Duluth,Minn. A7	175†
Fairfield,Ala. T2	175†
Houston,Tex. S5	180†
Johnstown,Pa. B2	179*
Joliet,Ill. A7	175†
KansasCity,Mo. S5	180†
Kokomo,Ind. C16	177†
Minnequa,Colo. C10	180**
Monessen,Pa. P7	179*
Pittsburg,Calif. C11	195†
Rankin,Pa. A7	175†
S.Chicago,Ill. R2	175**
S.SanFrancisco C10	195**
SparrowsPoint,Md. B2	181*
Sterling,Ill.(1) N15	179*

WOVEN Fence, 9-15 Ga.

	Col.
Ala.City,Ala. R2	162**
Ala.City, 17 ga. R2	241**
Ala.City, 18 ga. R2	251**
Aliq'ppa,Pa.9-14½ga J5	165§
Atlanta A11	168
Bartonville,Ill K4	168
Crawfordsville,Ind. M8	168
Donora,Pa. A7	162†
Duluth,Minn. A7	162†
Fairfield,Ala T2	162†
Houston,Tex. S5	167†
Johnstown,Pa.(43) B2	166
Joliet,Ill. A7	162†
KansasCity, Mo. S5	167†
Kokomo,Ind. C16	164†
Minnequa,Colo. C10	167**
Monessen,Pa. 9 ga. P17	166*
Pittsburg,Calif. C11	185†
Rankin,Pa. A7	162†
S.Chicago,Ill. R2	162**
Sterling,Ill.(1) N15	166*

WIRE (16 Gage)	An'ld Stone	Galv. Stone
Ala.City R2	14.50	16.05**
Bartonville K4	14.60	16.50
Buffalo W12	14.50	....
Cleveland A7	14.50	....
Crawf'dsville M8	14.60	16.50
Fostoria,O. S1	14.60	16.15†
Johnstown B2	14.15	16.40*
Kokomo C16	14.60	16.15†
Minnequa C10	14.75	16.45**
Palmer,MassW12	14.50	16.05*
Pitts.,Calif. C11	14.85	16.40†
S.Chicago R2	14.50	16.05**
SparrowsPt. B2	14.60	16.50*
Sterling(1) N15	14.50	16.45††
Waukegan A7	14.50	16.05†
Worcester A7	14.80	....

WIRE, Merchant Quality (6 to 8 gage)	An'ld	Galv.
Ala.City,Ala. R2	7.40	7.80**
Aliquippa J5	7.40	7.925§
Atlanta A11	7.50	8.075
Bartonville(48) K4	7.50	8.075
Buffalo W12	7.40	8.80†
Cleveland A7	7.40	....
Crawfordsville M8	7.50	8.075
Donora,Pa. A7	7.40	7.80†
Duluth,Minn. A7	7.40	7.80†
Fairfield T2	7.40	7.80†
Houston,Tex. S5	7.65	8.05†
Jacks'ville,Fla.M8	7.90	8.475
Johnstown B2(48)	7.40	7.975*
Joliet,Ill. A7	7.40	7.80†
KansasCity,Mo. S5	7.65	8.05†
Kokomo C16	7.50	7.90†
LosAngeles B3	8.35	8.925*
Minnequa C10	7.65	8.05**
Monessen P7 (48)	7.40	7.975*
Palmer,Mass. W12	7.70	8.10†
Pitts.,Calif. C11	8.35	8.75†
Portsmouth,O. P12	7.40	....
Rankin A7	7.40	7.80†
S.Chicago R2	7.40	7.80**
S.SanFran. C10	8.35	8.75**
Spar'wsPt.B2(48)	7.50	8.075*
Str'ing(1)(48)N15	7.40	8.00††
Struthers,O.(48)Y1	7.40	7.90‡
Worcester,Mass.A7	7.70	....

*Based on 12.50c zinc; †5c zinc; §10c zinc; ‡Less than 10c zinc; **Subject to zinc equalization extras. ††13c zinc.

FASTENERS

(Base discounts, full case quantity, per cent off list to consumer, f.o.b. mill)

Carriage, Machine Bolts	
Full-Size Body (cut thread)	
†½" x 6" and smaller	61
Larger than ½" diam. and all diams. longer than 6"	55
Under-Size Body (rolled thread; not nutted):	
½" x 6" and smaller	61
NUTS	
Reg. & Heavy Square Nuts, all sizes	61
H. P. Reg. & Heavy Hex Nuts:	
⅝" & smaller	64
¾" to 1⅛" incl.	63
1¼" to 1½" incl.	65
1⅝" & larger	61
C.P. Reg. & Heavy Hex Nuts	
⅝" & smaller	64
¾" & larger	61
Semifinished & Finished Nuts	
⅝" & smaller	66
¾" & larger	63
Semifinished Slotted Reg. & Heavy Hex Nuts	
⅝" & smaller	66
¾" & larger	63
Hot Galvanized Nuts, all types	
1½" & smaller	44

(On above items, add 25% for less than case quantities).

CAP SCREWS

(New Std., hexagon head, upset, packages)

Bright:	
6" and shorter:	
¼" through ½" diam.	34
$\frac{9}{16}$" & ⅝" diam.	31
¾", ⅞", 1"	8
Longer than 6"	
¼" through ⅝" diam.	3
¾" through 1" diam.	+13
High Carbon, Heat-treated:	
6" and shorter:	
¼" through ½" diam.	20
$\frac{9}{16}$" & ⅝" diam.	16
¾", ⅞", 1"	+11
Longer than 6"	
¼" through ⅝" diam.	+23
¾" through 1" diam.	+41

(New Std. Hexagon head, upset, bulk)

Bright:	
½" x 6" & smaller & shorter	49
$\frac{9}{16}$" & ⅝" diam. x 6" & shorter	48
¾", ⅞", 1" x 6" & shorter	31
High Carbon, Heat-treated:	
½" x 6" & smaller & shorter	41
$\frac{9}{16}$" x ⅝" diam. & 6" & shorter	39
¾", ⅞", 1" x 6" & shorter	20

MACHINE SCREW NUTS & STOVE BOLT NUTS (Bulk)

No. 2 to ⅝" incl., Square:	
25,000 to 199,999 pieces	20
200,000 or more pieces	27
No. 2 to ⅝" incl., Hex:	
25,000 to 199,999 pieces	18
200,000 or more pieces	25

MACHINE SCREWS, SLOTTED (Bulk)

No. 2 to ¼" diam, incl.:	
25,000 to 199,999 pieces	20
200,000 or more pieces	27
$\frac{5}{16}$" to ½" diam, incl.:	
15,000 to 99,999 pieces	20
100,000 or more	27

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft. inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	21.06	20.42
1¼	13	....	24.94	20.45
1½	13	23.31	27.57	22.61
1¾	13	27.54	32.57	26.71
2	13	30.87	36.51	29.93
2¼	13	34.77	41.12	33.72
2¼	12	37.73	44.63	36.60
2½	12	41.57	49.16	40.31
2¾	12	45.00	53.22	43.65
3	12	47.99	56.76	46.55

RAILWAY MATERIALS

RAILS	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	4.725	4.625	4.675	5.65
Ensley,Ala. T2	4.725	4.625	....	5.65
Fairfield,Ala. T2	....	....	....	5.65
Gary,Ind. U5	4.725	....	....	...
Huntington,W.Va. W7	....	....	....	5.65
IndianaHarbor,Ind. I-2	4.725	4.625	4.675	...
Johnstown,Pa. B2	....	....	...	(16)5.65
Lackawanna,N.Y. B2	4.725	4.625	....	5.65
Minnequa,Colo C10	4.725	4.625	....	6.15
Steelton,Pa. B2	4.725	4.625	....	...
Williamsport,Pa. S19	....	....	....	5.65

TIE PLATES

Fairfield,Ala. T2	5.625
Gary,Ind. U5	5.625
Ind.Harbor,Ind. I-2	5.625
Lackawanna,N.Y. B2	5.625
Minnequa,Colo. C10	5.625
Seattle B3	5.775
Steelton,Pa. B2	5.625
Torrance,Calif. C11	5.775

TRACK BOLTS (20) Treated

Cleveland R2	12.40
KansasCity,Mo. S5	12.40
Lebanon,Pa. B2	12.40
Minnequa,Colo. C10	12.40
Pittsburgh O3, P14	12.40
Seattle B3	12.90

AXLES

Ind.Harbor,Ind. S13	7.25
Johnstown,Pa. B2	7.25

JOINT BARS

Bessemer,Pa. U5	5.825
Fairfield,Ala. T2	5.825
Ind.Harbor,Ind. I-2	5.825
Joliet,Ill. U5	5.825
Lackawanna,N.Y. B2	5.825
Minnequa,Colo. C10	5.825
Steelton,Pa. B2	5.825

SCREW SPIKES

Cleveland R2	11.90
Pittsburgh O3	11.90

STANDARD TRACK SPIKES

Fairfield,Ala. T2	7.90
Ind.Harbor,Ind. I-2, Y1	7.90
KansasCity,Mo. S5	7.90
Lebanon,Pa. B2	7.90
Minnequa,Colo. C10	7.90
Pittsburgh J5	7.90
Seattle B3	8.40
S.Chicago,Ill. R2	7.90
Struthers,O. Y1	7.90
Youngstown R2	7.90

METAL POWDER

(Per pound f.o.b shipping point in ton lots for minus 100 mesh, except as other wise noted)

	Cents
Sponge iron:	
98+% Fe, annealed.	9.25
Unannealed:	
Minus 100 mesh	11.75
Minus 35 mesh	8.25
Minus 20 mesh	9.00
Swedish, c.i.f. Camden, N. J., c.l. in bags.	9.50
Domestic (Swedish), f.o.b. Riverton, N.J., in bags	9.50
Canadian, f.o.b. Shipping point	9.50
Electrolytic iron:	
Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	22.00
Annealed, 99.5% Fe.	36.50
Unannealed (99+% Fe)	34.00
Unannealed (99+% Fe) (minus 325 mesh)	57.00
Powder Flakes (minus 16, plus 100 mesh)	31.00
Carbonyl Iron:	
97.9-99.8% size 5 to 10 microns	83.00-148.00
Aluminum:	
Atomized, 500 lb. drum frght. allowed	
Carlots	34.50
Ton lots	36.50
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	38.00-50.00†
Bronze, 5000-lb lots	61.25-64.50†
Copper:	
Electrolytic	56.75
Reduced	56.75
Lead	22.80
Manganese:	
Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.00
Nickel-Silver, 5000-lb lots	58.75-61.50†
Phosphor-Bronze, ¼-ton lots	58.50
Silicon	47.50
Solder	7.00*
Stainless Steel, 302	99.00
Stainless Steel, 316	$1.32
Tin	14.50*
Zinc, 5000-lb lots	18.75-32.50‡
Tungsten	Dollars
Melting grade, 99% 60 to 200 mesh:	
1000 lb and over	4.50
Less than 1000 lb.	4.65
Chromium, electrolytic 99.2% Cr min.	3.50

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni, **64% Cu, 18% Zn, 18% Ni.

Footnotes

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(1) Chicago Base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25 off for untreated.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Mild plow, 10.55c.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.25c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill and 0.45c for carbon, add 0.40c for alloy and 0.45c H.S.-L.A.
(31) Widths over ⅝-in.; 6.90c for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 Ga. & heavier; 60" & narrower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.35c.
(43) 9-14½ Ga.
(48) 6-7 Ga.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	6.5	+10	10.5	+7.25	13	+4.75	14.5	+3.25	14.5	+3.25	14	+3.75	16.5	+1.25
Ambridge, Pa. N2	6.5	..	10.5	...	13	...	14.5	...	14.5	...	14	...	16.5	...
Lorain, O. N3	6.5	+10	10.5	+7.25	13	+4.75	14.5	+3.25	14.5	+3.25	14	+3.75	16.5	+1.25
Youngstown Y1	6.5	+10	10.5	+7.25	13	+4.75	14.5	+3.25	14.5	+3.25	14	+3.75	16.5	+1.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	6.5	+10	10.5	+7.25	13	+4.75	14.5	+3.25	14.5	+3.25	14	+3.75	16.5	+1.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	9
Alton, Ill. L1	...	...	....	....	....	....	15.5	+1.75	18.5	2.25	21	5.75	23.5	7
Benwood, W. Va. W10	16.5	+12	7.25	+18.25	+1.75	+26.25	17.5	0.25	20.5	4.75	23	7.75	25.5	7
Butler, Pa. F6	17.5	+11	9	+16.5	0.5	+24	...	...	...	...	...	...	...	...
Etna, Pa. N2	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	9
Fairless Hills, Pa. N3	...	...	....	....	....	....	15.5	+1.75	18.5	2.75	21	5.75	23.5	7
Fontana, Calif. K1	...	...	....	....	....	....	6	+11.25	9	+7.25	11.5	+3.75	14	+2.5
Ind. Harbor, Ind. Y1	...	...	....	....	....	....	16.5	+0.75	19.5	3.25	22	6.75	24.5	8
Lorain, O. N3	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	9
Sharon, Pa. S4	17.5	+11	9	+16.5	0.5	+24	...	...	...	...	...	...	...	...
Sharon, Pa. M6	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	9
Sparrows Pt., Md. B2	15.5	+13	7	+18.5	+1.5	+26	15.5	+1.75	18.5	2.25	21	5.75	23.5	7
Youngstown R2, Y1	...	...	....	....	....	....	17.5	0.25	20.5	4.25	23	7.75	25.5	9
Wheatland, Pa. W9	17.5	+11	9	+16.5	0.5	+24	17.5	0.25	20.5	4.25	23	7.75	25.5	9

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	26	10	26.5	10.5	28	10.75	28	10.75	....	...	....	...
Alton, Ill. L1	24	8	24.5	8.5	26	8.75	26	8.75	....	...	....	...
Benwood, W. Va. W10	26	10	26.5	10.5	28	10.75	28	10.75	18.5	0.75	18.5	0.75
Etna, Pa. N2	26	10	26.5	10.5	28	10.75	28	10.75	18.5	0.75	18.5	0.75
Fairless Hills, Pa. N3	24	8	24.5	8.5	26	8.75	26	8.75	16.5	+1.25	16.5	+1.25
Fontana, Calif. K1	14.5	+1.5	15	+1	16.5	+0.75	16.5	+0.75	7	+10.75	7	+10.75
Ind. Harbor, Ind. Y1	25	9	25.5	9.5	27	9.75	27	9.75	17.5	+0.25	17.5	+0.25
Lorain, O. N3	26	10	26.5	10.5	28	10.75	28	10.75	....	...	....	...
Sharon, Pa. M6	26	10	26.5	10.5	28	10.75	28	10.75	....	...	....	...
Sparrows Pt., Md. B2	24	8	24.5	8.5	26	8.75	26	8.75	16.5	+1.25	16.5	+1.25
Youngstown R2, Y1	26	10	26.5	10.5	28	10.75	28	10.75	18.5	0.75	18.5	0.75
Wheatland, Pa. W9	26	10	26.5	10.5	28	10.75	28	10.75	18.5	0.75	18.5	0.75

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*Galvanized pipe discounts based on current price of zinc (13.00c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingots	Rerolling Slabs, Billets	Forging Billets	Seamless Tube Billets	H.R. Strip	Shapes; H.R. & C.F. Bars; Wire	Plates	Sheets	C.R. Strip; Flat Wire
201	17.00	21.50	....	....	31.00	....	....	42.25	39.00
202	18.25	24.00	31.00	36.25	33.50	36.75	38.75	42.50	42.50
301	17.75	22.25	....	36.75	32.00	38.00	....	44.25	41.00
302	19.00	24.75	32.00	37.25	34.50	38.25	40.25	44.50	44.50
302B	20.25	26.50	33.00	37.25	37.75	38.25	40.25	47.00	47.00
303	....	26.75	34.75	40.00	....	41.00	....	....	....
304	20.25	26.00	33.75	39.00	37.25	40.25	43.00	47.25	47.25
304L	....	....	38.75	44.00	42.25	45.25	48.00	52.25	52.25
305	21.75	28.25	....	39.50	40.25	40.25	43.50	50.25	50.25
308	22.00	29.00	38.50	44.25	41.25	45.50	49.75	52.00	52.00
309	29.50	38.25	46.75	53.50	53.50	54.75	58.25	67.00	67.00
309S	31.50	41.00	51.00	59.00	58.50	60.25	63.75	74.00	74.00
310	37.25	48.00	62.25	72.25	68.50	73.50	75.25	78.75	78.75
314	....	....	....	....	....	....	75.25	....	....
316	31.50	40.25	51.25	59.50	58.25	60.75	64.00	68.25	68.25
316L	....	....	56.25	64.75	63.25	65.75	69.25	73.25	73.25
317	37.25	48.25	62.75	72.75	73.50	74.50	77.00	83.75	83.75
321	25.00	32.00	38.25	44.00	44.25	45.25	49.25	54.25	54.25
18-8CbTa	29.25	38.00	45.75	52.25	53.25	53.50	58.00	66.50	66.50
403	....	....	28.75	32.75	....	34.00	36.25	....	44.00
405	17.50	23.00	26.75	31.00	32.25	32.00	33.75	42.25	42.25
410	15.00	19.50	25.50	29.50	28.00	30.50	31.75	36.25	36.25
416	....	....	26.00	30.00	....	31.00	....	....	....
420	23.50	30.25	31.00	36.00	37.75	37.25	40.75	56.00	56.00
430	15.25	19.75	26.00	30.00	28.75	31.00	32.25	36.75	36.75
430F	....	....	26.50	30.50	....	31.50	....	....	....
431	16.00	20.50	26.50	30.50	29.75	31.50	33.00	38.00	38.00
446	....	....	35.50	40.50	53.25	42.00	43.25	63.25	63.25

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Tube Div.. American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co., Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates Carbon Base 10%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless:			
302	....	....	30.50
304	30.30	36.05	32.50
304-L	32.30	37.95	....
310	41.30	47.00	....
316	35.50	41.40	47.00
316-L	40.00	46.10	....
316-CB	41.15	48.45	....
321	32.00	37.75	37.25
347	34.40	41.40	48.25
405	25.80	33.35	....
410	25.30	32.85	....
430	25.30	32.85	....
Inconel	49.45	65.45	....
Nickel	41.05	55.65	....
Nickel, Low Carbon	43.25	60.05	....
Monel	42.35	56.35	....
Copper*	....	....	46.00

	Strip, Carbon Base, Cold Rolled 10%	Strip, Carbon Base, Cold Rolled Both Sides
Copper*	30.00	38.00

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*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.275	5%Cr Hot Work	0.430-0.460
Extra Carbon	0.330	W-Cr Hot Work	0.450
Special Carbon	0.390	V-Cr Hot Work	0.470
Oil Hardening	0.430	Hi-Carbon-Cr	0.770

Grade by Analysis (%)

W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	...	4.090
18.25	4.25	1	4.75	...	2.305-2.475
18	4	2	9	...	2.675-2.6775
18	4	2	....	...	1.765
18	4	1	....	...	1.600
13.75	3.75	2	5	...	2.245
13.5	4	3	....	...	1.865
9	3.5	..	....	...	1.180
6	4	2	....	5	1.105
6	4	3	....	6	1.350
1.5	4	1	....	8.5	0.960

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, M14, S8, U4, V2 and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
AlabamaCity,Ala. R2	54.50	55.00‡	....	....
Birmingham R2	54.50	55.00‡	....	....
Birmingham U6	....	55.00‡	59.00	....
Woodward,Ala. W15	54.50	55.00‡	59.00	....
Cincinnati, deld.	....	62.70	....	....
Buffalo District				
Buffalo H1, R2	58.50	59.00	59.50	60.00
Tonawanda,N.Y. W12	58.50	59.00	59.50	60.00
N.Tonawanda,N.Y. T9	....	59.00	59.50	60.00
Boston, deld.	69.15	69.65	70.15	....
Rochester,N.Y. deld.	61.52	62.02	62.52	....
Syracuse,N.Y. deld.	62.62	63.12	63.62	....
Chicago District				
Chicago I-3	58.50	59.00	59.00	59.50
Gary,Ind. U5	58.50	....	59.00	....
S.Chicago R2	58.50	....	59.00	....
S.Chicago,Ill. Y1	58.50	59.00	59.00	59.50
S.Chicago,Ill. U5, W14	58.50	....	59.00	59.50
Milwaukee, deld.	60.67	61.17	61.17	61.67
Muskegon,Mich. deld.	....	65.30	65.30	....
Cleveland District				
Cleveland A7, R2	58.50	59.00	59.00	59.50
Akron,O., deld.	61.25	61.75	61.75	62.25
Lorain,O. N3	58.50	....	....	59.50
Mid-Atlantic District				
Bethlehem.Pa. B2	60.50	61.00	61.50	62.00
NewYork, deld.	....	64.75	65.25	....
Newark, deld.	63.52	64.02	64.52	65.02
Birdsboro,Pa. B10	60.50	61.00	61.50	62.00
Chester,Pa. P14	60.50	61.00	61.50	....
Philadelphia, deld.	62.16	62.66	63.16	....
Steelton,Pa. B2	60.50	61.00	61.50	62.00
Swedeland.Pa. A3	60.50	61.00	61.50	62.00
Philadelphia, deld.	62.16	62.66	63.16	63.66
Troy,N.Y. R2	60.50	61.00	61.50	62.00
Pittsburgh District				
NevilleIsland,Pa. P6	58.50	59.00	59.00	....
Pittsburgh (N&S sides), Aliquippa, deld.	....	60.37	60.37	60.87
McKeesRocks, deld.	....	60.04	60.04	60.54
Lawrenceville,Homestead, Wilmerding, Monaca, deld.	....	60.66	60.66	61.16
Verona,Trafford, deld.	60.69	61.19	61.19	61.69
Brackenridge, deld.	60.95	61.45	61.45	61.95
Bessemer,Pa. U5	58.50	....	59.00	59.50
Clairton,Rankin,S.Duquesne,Pa. U5	58.50	....	....	....
McKeesport,Pa. N3	58.50	....	....	59.50
Midland,Pa. C18	58.50	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malleable	Bessemer
Hubbard,O. Y1	....	....	59.00	....
Sharpsville,Pa. S6	58.50	....	59.00	59.50
Youngstown Y1	....	....	59.00	59.50
Youngstown U5	58.50	....	....	59.50
Mansfield,O., deld.	63.40	....	63.90	64.40
Duluth I-3	58.50	59.00	59.00	59.50
Erie,Pa. I-3	58.50	59.00	59.00	59.50
Everett,Mass. E1	62.00	62.50	63.00	....
Fontana,Calif. K1	64.50	65.00	....	....
Geneva,Utah C11	58.50	59.00	....	....
GraniteCity,Ill. G4	60.40	60.90	61.40	....
Ironton Utah C11	58.50	59.00	....	....
LoneStar,Texas L6	....	55.00*	....	....
Minnequa,Colo. C10	60.50	61.00	61.50	....
Rockwood,Tenn. T3	....	55.00‡	59.00	....
Toledo.O. I-3	58.50	59.00	59.00	59.50
Cincinnati, deld.	64.26	64.76	....	....

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*Phos. 0.51-0.75%; $56, Phos. 0.31-0.50%.

‡Intermediate (Phos. 0.31-0.69%), $56.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.05% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. G2, J1	$67.50
Buffalo H1	68.75

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

NiagaraFalls,N.Y. P15	$83.50
Keokuk,Iowa, (Open-hearth & Fdry, freight allowed K2)	90.00
Keokuk, O.H. & Fdry, 12½ lb piglets, 16% Si, frgt allowed K2	93.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$72.50
Steelton,Pa. B2 (Phos. 0.035% max)	66.50
Philadelphia, deld.	70.05
Troy,N.Y. R2 (Phos. 0.035% max)	66.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 25 cents per 100 lb except: Buffalo, Cleveland, Erie, 30 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Birmingham, Chattanooga, Jackson, 15 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, San Francisco, 10 cents; Atlanta, Houston, Seattle, Spokane, no charge.

	SHEETS				STRIP		BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.‡	H.R. Alloy 4140††^{5}		Carbon	Floor
Atlanta	7.14	8.20	8.87	....	7.40	...	7.42	9.39	....	7.63	7.49	9.48
Baltimore	7.03	8.32	8.37	....	7.65	...	7.61	8.62^{9}	13.44	7.93	7.21	8.87
Birmingham	6.80	7.90	8.85	....	7.06	...	7.08	9.35	....	7.28	6.99	9.10
Boston	7.70	8.81	10.27	45.67	7.96	...	7.83	9.53	14.45	8.13	7.89	9.36
Buffalo	6.80	8.05	9.77	....	7.15	...	7.10	7.90	13.10	7.40	7.15	8.70
Chattanooga	6.95	8.10	8.60	....	7.20	...	7.20	9.18	....	7.45	7.25	9.05
Chicago	6.80	8.09	8.50	49.05	7.06	...	7.08	7.75	12.85	7.28	6.99	8.46
Cincinnati	6.92	8.08	8.90	46.10	7.30	...	7.32	8.05	13.09	7.75	7.28	8.71
Cleveland	6.80	8.09	8.85	49.16	7.16	...	7.14	7.85	12.91	7.61	7.16	8.63
Detroit	6.99	8.28	8.78	43.50	7.34	...	7.36	8.04	13.06	7.75	7.27	8.65
Erie, Pa.	6.80	7.90	8.85	....	7.15	...	7.08	7.85	....	7.40	7.15	8.63
Houston	7.85	8.75	10.49	....	8.15	...	8.25	9.85	14.00	8.20	7.80	9.20
Jackson, Miss.	7.10	8.20	9.20	....	7.40	...	7.40	9.44	....	7.60	7.45	9.30
Los Angeles	8.05	10.00	11.00	....	8.35	...	8.05	11.25	14.25	8.30	8.05	10.25
Milwaukee	6.89	8.18	8.59	....	7.15	...	7.17	7.94	12.94	7.45	7.08	8.55
Moline, Ill.	7.15	8.44	8.85	....	7.41	...	7.43	8.10	....	7.63	7.34	...
New York	7.46	8.68	9.44	44.95	8.07	...	7.96	9.48	13.28	7.99	7.76	9.19
Norfolk, Va.	7.25	...	...	....	7.65	...	7.65	9.50	....	7.95	7.45	8.95
Philadelphia	7.14	8.42	9.35	45.98	7.67	9.02	7.64	8.46	13.16	7.74	7.37	8.69**
Pittsburgh	6.80	8.09	9.20	49.00	7.16	...	7.08	7.85	12.85	7.28	6.99	8.46
Portland, Oreg.	7.80	8.80	10.65	....	8.00	...	7.95	12.20	15.00	7.85	7.75	9.60
Richmond, Va.	7.00	...	9.47	....	7.65	...	7.70	8.85	....	7.95	7.20	9.10
St. Louis	7.09	8.38	9.19	43.89	7.35	...	7.37	8.14	13.14	7.68	7.28	8.75
St. Paul	7.46	8.59	9.16	....	7.72	...	7.74	8.51	13.51	7.94	7.65	9.12
San Francisco	8.10	9.65	10.15	51.65	8.35	...	8.05	11.20	14.25^{3}	8.25	8.05	10.25
Seattle	8.55	10.40	10.80	54.00	8.65	...	8.35	11.70	14.60	8.30	8.20	10.10
Spokane	8.55	11.00^{7}	10.80	....	9.05	...	8.35	11.80	15.35	8.30	8.20	10.60
Washington	7.50	8.79	7.97	....	8.12	...	8.08	9.09	....	8.40	7.68	9.34

Prices do not include gage extras; †prices include gage and coating extras (based on 12.50-cent zinc), except in Birmingham (coating extra excluded); ‡includes 35-cent special bar quality extras; **¼-in. and heavier; ††as annealed; §§under ⅛-in.

Base quantities, 2000 to 4999 lb except as noted; Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York and Boston, 10 000 lb, and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; ^{2}—500 to 9999 lb; ^{3}—400 to 999 lb; ^{4}—4000 lb and over; ^{5}—1000 to 1999 lb; ^{6}—1000 lb and over; ^{7}—1500 to 3999 lb; ^{8}—2000 to 3999 lb; ^{9}—f.o.b. local delivery in lots of 10,000 lb and over.

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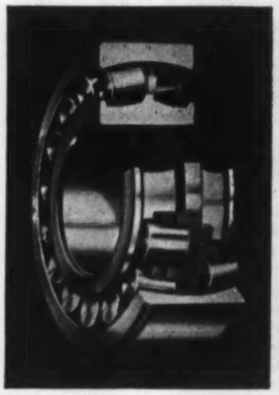

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Republic Steel Corp.

The nickel shortage may force switch to substitutes as . . .

Stainless Faces Cutbacks

STAINLESS STEEL producers are faced again with serious cutbacks in civilian production unless they can obtain substantial supplies of nickel in the immediate future.

That is the story industry spokesmen told Business & Defense Services Administration. The government's action in releasing 1.1 million lb of nickel for November and December hasn't changed the plot much. As one producer told STEEL: "It's like giving two slices of bread to a starving man who needs a whole loaf. It's a step in the right direction, but it's just not enough."

Already Hurt—According to BDSA officials, there already has been some cutback in civilian production of the nickel-bearing grades of stainless. Several industry officials indicate that is nothing compared to what will happen in late November and December if nickel supply doesn't perk up. One major producer states he has scraped the bottom of the barrel to complete November melts. He doesn't know what his company will do in December. Another says nickel supplies for his company have reached the six-day stage, with no improvement in sight. Still another states his company may be forced to cut back nickel stainless production by Nov. 15 on the basis of nickel on hand. So it goes for practically all producers.

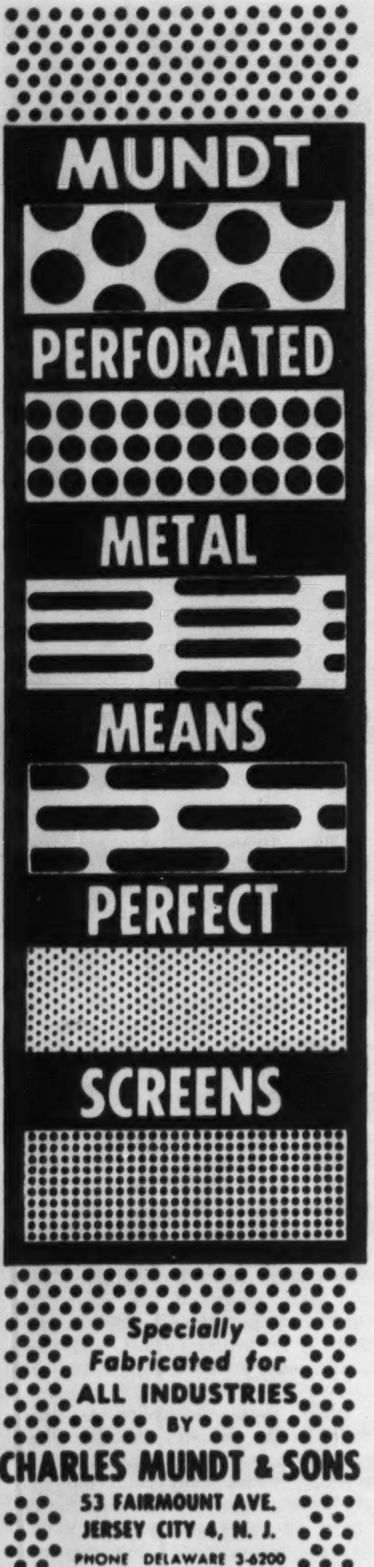
Stainless producers find themselves in a paradoxical position: Through September, they were heading for one of the best years they have ever had, yet they claim the nickel shortage is threatening their livelihood. For the first nine months of 1955, net shipments of mill products were running 57.6 per cent ahead of the same 1954 period. In fact, according to the American Iron & Steel Institute, shipments through September were 51,593 tons more than the total 1954 shipments. In contrast, shipments of all steel products were only about 30 per cent ahead of the 1954 period. Equally impressive is the fact that nine-month shipments this year are 9022 tons ahead of shipments for the same period in 1953, which was the record year.

Three Reasons—There are three reasons for this good showing despite the nickel shortage. The fact that 1954 was the worst year for stainless shipments in the six years for which figures are available accentuates the percentage figures. Also, the government claims it has been responsible for high-level shipments because of the 24 million lb of nickel it has freed for industry.

However, producers say the government metal has not been a big factor. With defense-rated orders heavier than anticipated, the extra metal simply allowed them to maintain previous levels. They claim that the heavy production has come from eating into their own inventories which they carried over from 1954 and from using all the scrap that they could get their hands on. Now there is no inventory left, and scrap is not only priced too high but also scarce.

Price Problems—There is some doubt in the industry that the latest release of government metal will be of much value. They point out that the price is too stiff—it sells for between 90 cents and $1.00 a pound. So far, commitments for this new government metal have been insignificant.

Rather than lose customers, some producers have turned again to pushing chrome and manganese grades



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as substitutes. As usual, customer resistance to change has been great, but some success is evident. For instance, Allegheny Ludlum Steel Corp. reports that enough customers have made the switch to permit its operations to remain on a high level even if nickel continues short into 1956. A U. S. Steel Corp. official says: "Most producers are at capacity production, but their product mix is not normal. It is more than the usual amount of nonnickel grades."

Matter of Education—Most producers agree that it is not the nickel content of 18-8 stainless that makes it so popular with many customers, but the know-how in using it. This includes some defense users. If the producers can educate those consumers to use the other grades properly, they feel they will have gone a long way in relieving the shortage of nickel-bearing grades.

One producer believes the big switch to substitutes won't come until next month. "It is hard to convince customers of a shortage until it hits them directly. When cancellations start hitting them, they'll start asking for other grades."

Stainless Steel . . .

Stainless Steel Prices, Page 170

Production of stainless and heat-resisting steel ingots totaled 288,262 net tons in the third quarter, reports the American Iron & Steel Institute. This was a slight decline compared with output of 300,024 tons in the second quarter but was up sharply from the 194,113 tons produced in the third quarter last year.

Output in the first nine months of this year was 879,183 net tons. This compares with 564,926 in the like period of 1954, and with 836,403 tons in the corresponding period of 1953.

Most producers are operating at capacity, but several have been forced to cut production of nickel-bearing stainless grades, due to the shortage of nickel.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 167 & 168

Sheetmakers generally have cut their first quarter "pies" and in most cases, the pieces are pretty small. At least they are far smaller than consumers want. Some makers have no more than six weeks of capacity open for new bookings in the period. This is not only true of hot and cold-rolled sheets, the major tonnage items, but of some specialties as well.

Indicative of producers' distributing policy, Inland Steel Co., Chicago, hopes to get current on deliveries by the end of the first quarter and is using an allocation system to do it.

Customers may take their first quarter tonnage from orders already on file, or they may substitute new specifications.

Heavier shipments of delinquent sheet tonnage are tiding over New England consumers.

U. S. Steel Corp. will install a new line for production of enameling sheets at its Irvin Works, Dravosburg, Pa.

Wire . . .

Wire Prices, Pages 166 & 169

American manufacturers will use 3500 tons of steel wire to produce 6 million gross of wire clothespins this year. Domestic wire mills will share in the business in only a minor way. Eighty per cent of galvanized wire needs (close to 300 tons monthly) are imported, chiefly from the Benelux countries.

A few of the dozen clothespin manufacturers, most of them in New England, buy 25 per cent of their 0.20-0.25 carbon wire from domestic mills to maintain a position on American wiremakers' books. Other manufacturers purchase all their wire abroad at a cost running around 2 cents per pound lower than that of domestic wire.

Producers of wire rods and manufacturers wire have little tonnage left for December shipment. They are accepting business for first quarter delivery. But they are far from sold out in the current quarter on merchant products.

Pressure for delivery of industrial grades of wire is accompanied by more forward buying in New England, as mill shipments tend to become extended.

Demand for heading grades is more active, also spring stock.

Record Steel Shipments

Shipments of finished steel in September were record-breaking for that month at 7,378,247 tons, reports the American Iron & Steel Institute. Movement in the first nine months of the year, totaling 62,672,603 tons, also set a new mark.

The September total topped the previous record for the month, set in 1952, by more than 836,000 tons. During the first three quarters of the year, shipments were 32 per cent greater than the 47,450,173 tons moved in the same period last year and about 824,000 tons more than the previous nine-month record set in 1953.

Records were established in sheet

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189

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN and strip and in tin mill products during the first nine months.

During the first three quarters this year, shipments of steel products to automotive consumers set a record at 13,860,199 tons, 23.1 per cent of total domestic shipments to all consumers. Nine-month shipments to that group were nearly 2 million tons greater than the previous high tonnage for the same period in 1953. September shipments to auto consumers totaled 1,493,390 tons.

Cumulative total shipments to warehouses through September this year amounted to 11,557,484 tons, about 177,000 more than in the prior nine-month record period in 1953.

Steel Bars . . .

Bar Prices, Page 166

Pressure for hot-rolled carbon bars continues strong. Most mills are running a month to six weeks behind on delivery promises, and they will have carry-overs of at least a month going into first quarter. Any progress in becoming current on commitments over the next few months will be due to cutbacks, or the blanking out of bookings for various periods, rather than to any easing in demand.

Practically all mills are accepting first quarter hot-rolled orders, but on a month-to-month basis. Sellers of hot and cold-rolled alloy bars, however, are fairly current on commitments.

In New England, with the possible exception of leaded grades of cold-finished bars, area consumers are not worried as to near-future cold-finished supplies. One district producer has temporarily halted production of flats and squares in the leaded grades. Considerable bar tonnage has been revalidated for January-February shipment, carry-over depending on size and grade. Some tonnage will be available from the new Bridgeport, Conn., bar mill late in first quarter.

Pittsburgh area mills are reported cutting down on early first quarter allotments in an effort to reduce their backlogs. Most fabricators' inventories are falling.

Tubular Goods . . .

Tubular Goods Prices, Page 170

During October an all-time steel ingot production record of 330,015 tons was established by the National Tube Division, U. S. Steel Corp. Both the National Works at McKeesport, Pa., and the Lorain Works, Lorain, O., contributed with plant records. Blast furnace departments at both plants also established all-time iron production records.

Sellers of merchant pipe can still accept tonnage for early December on the smaller sizes, but they are sold out through the quarter on larger sizes.

Plates . .

Plate Prices, Page 166

Plate producers still are moving slowly in accepting tonnage for first quarter shipment. Only one in the East has opened books for the entire period, after having blanked out January production to care for the overflow from fourth quarter this year.

Most mills, it appears, are booking for the first quarter on a month-to-month basis. A few haven't definitely become committed on any new orders for shipment in the period.

Light gage plates are tightening, New England small tank builders report. Some producers are reluctant to book below 5/16-in. Many consumers that ordinarily fill their requirement at the mill level are turning to warehouses for relief.

Sellers, generally, are turning down a lot of business. Car equipment re-

Finish reams
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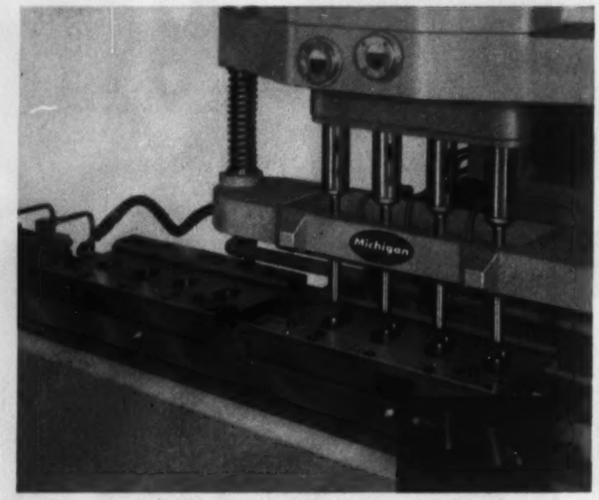
per hour



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quirements are mounting rapidly with the New York Central's inquiry for 14,750 cars, the largest in recent years, featuring developments in that field. Shipwork is expected to pick up as time passes, though at the moment demand on shipbuilding account is described as spotty.

Three Texas tower radio platforms, involving 19,500 tons of steel, mostly plates, brought out two combination bids to the First Naval District, Boston.

The Claymont, Del., platemaker has encountered further difficulty in getting its larger mill back into operation. The unit is still down, and it is not likely to get back into production before next month.

Rails, Cars . . .

Track Material Prices, Page 169

The New York Central Railroad's inquiry for 14,750 freight cars, which came out a week ago, is the largest in years. The equipment will require about 380,000 tons of steel, including wheels, axles and trucks.

With the steel mills already greatly oversold, and with the stringency likely to continue for some time, the problem is steel availability.

Inquiry includes 5000 fifty-ton boxcars, 9250 seventy-ton self-clearing hopper cars and 500 seventy-ton covered hopper cars.

Warehouse . . .

Warehouse Prices, Page 171

Warehouses are feeling increasing pressure from mill-quantity consumers which are unable to get sufficient tonnage from mills and seek to augment supplies with higher-priced warehouse material. In this situation, the distributors are unable to offer much assistance. Their own inventories are thinning out on more products.

Distributors are growing more apprehensive about steel supply for the first quarter. Most of them can't determine if their allotments will increase or decrease for that period. The consensus is that stocks of sheet, plate and bars will continue to grow more unbalanced. After mills catch up with lagging deliveries, it's conceded that supply could quickly cease to be a problem in the second quarter.

Structural shapes, plates and hot-rolled sheets are among the most difficult products to obtain at present. Demand for hot-rolled bars is strong, but the position of cold-finished bars is comfortable. Demand for alloy steel has picked up, with inventories in better shape than carbon steel stocks.

The list of long-established New England steel warehouses adding aluminum products for distribution is growing. The two latest: Hawkridge Bros. Co., Boston and Waterbury, Conn., and L. E. Zurbach Steel Co., Somerville, Mass.

Cement Prices To Go Up

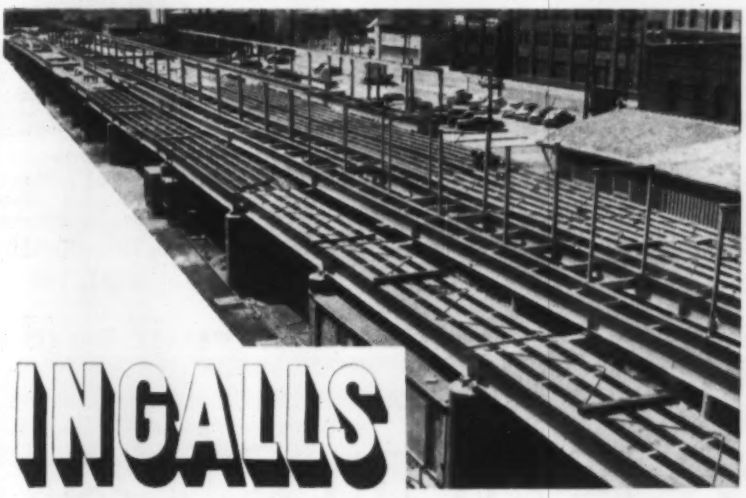
Universal Atlas Cement Co., a U. S. Steel subsidiary, announced an increase of 25 cents per barrel in mill prices on standard cement (effective date, first quarter, 1956). It's the first general price hike since July 1, 1954.

Pig Iron . . .

Pig Iron Prices, Page 171

Merchant pig iron business is being well sustained at the October rate, the highest this year in some districts. November bookings as a whole may be off, however, because of the fewer working days and the possibility of some seasonal letup late in the month.

Contributing to current activity are good operations at foundries, coupled with rather limited inventories. In the East, however, there are evidences that some foundries laid in



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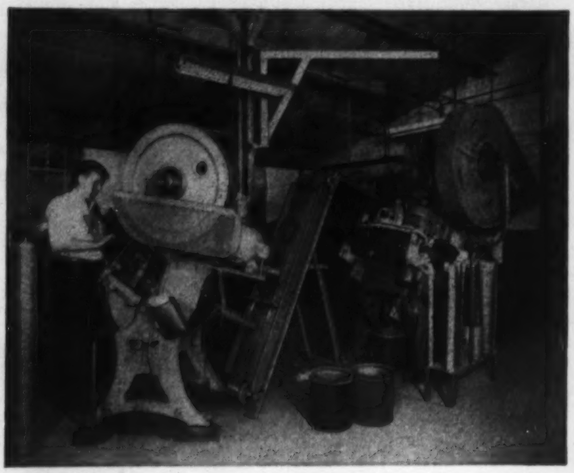

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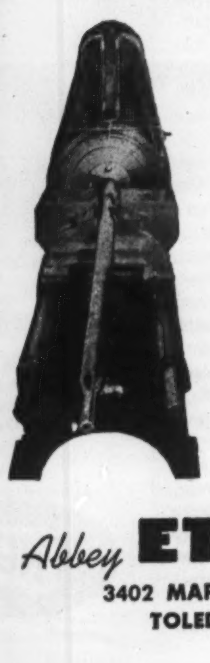

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substantial quantities of Chester iron before the producer at the point advanced its prices to the general district level a few weeks ago.

High prices for scrap also are a factor in sustaining pig iron demand since furnace operators are using a higher percentage of iron in their mix.

Demand for castings is expected to hold up well through the first quarter. After that, developments in the automotive industry will determine the pattern.

Structural Shapes . . .

Structural Shape Prices, Page 166

Reflecting the advancing season, structural steel demand at most points is easing a little. Considerable work, however, is still being figured and most fabricators anticipate full operations for months to come, or at least as full as the availability of steel will permit.

Scarcity of shapes continues to restrict output of some shops, and no relief is in early prospect. Even where fabricators are able to maintain five-day-a-week operations, they are not always able to live up to their promises because of temporary shortages in some items needed for specific jobs.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3000 tons, Grays Harbor, Wash., pulp mill for Weyerhaeuser Timber Co., to Issacson Iron Works, Seattle; Hoffman Construction Co., Portland, Oreg., general contractor.

2600 tons, railroad bridges, Trout Creek, Mont., through Ebasco Services, New York, to the Kansas City Structural Steel Co., Kansas City, Kans.

2000 tons, Schuylkill power plant addition, Philadelphia Electric Co., Philadelphia, to Ingalls Iron Works, Birmingham.

1800 tons, 21-story office building, Fisher Bros., 54th St., and Park Ave., New York, to Bethlehem Steel Co., Bethlehem, Pa.

525 tons, warehouse and office building, King of Prussia, Pa., to Bethlehem Fabricators, Bethlehem, Pa.

390 tons, correctional institute buildings, DeQuincy, La., to Smiley Steel Co., Lake Charles, La.; J. A. Jones Construction Co., Shreveport, La., general contractor.

340 tons, state highway bridge, Rockland county, New York, through A. E. Ottaviano, general contractor, to Pine Brook Iron Works, Scranton, Pa.

225 tons, 2-span girder bridge, Connecticut turnpike, East Ave., Norwalk, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Mariani Construction Co., New Haven, Conn., general contractor; part of contract for substructure, Norwalk river bridge, taking 1675 tons, steel piles, and 585 tons, reinforcing bars.

205 tons, 2-span continuous girder bridge over Wilbur Cross highway, Tolland, Conn., to Phoenix Bridge Co., Phoenixville, Pa.; D. Arrigoni Co., Middletown, Conn., general contractor.

150 tons, buildings, Kaiser Aluminum & Chemical Corp., Ravenswood, W. Va., to Allied Structural Steel Co., Richmond, Va.; Southeastern Construction Co., Morgantown, W. Va., general contractor.

130 tons, flood emergency replacement, Duchess county, New York, through John Ardorio Inc., Poughkeepsie, N. Y., general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

110 tons, log haul for Simpson Logging Co., Shelton, Wash., to Pacific Car & Foundry Co., Seattle.

STRUCTURAL STEEL PENDING

7335 tons, bridge superstructure, Housatonic river, Stratford-Milford, Conn., Connecticut turnpike, American Bridge Division, U. S. Steel Corp., Pittsburgh, low, $4,643,188.30; also 875 tons, concrete reinforcing bars.

6915 tons, elevated viaduct and ten grade separation structures, Connecticut turnpike, Greenwich-Stamford, Conn.; also 805 tons of steel piling, 2040 tons of reinforcing bars and 599 tons of highway mesh; bids Nov. 24 at Hartford, Conn.

4500 tons, towers, guides and sills, structurals and rails, Barnhart Island power plant, St. Lawrence project; bids Nov. 15, Power Authority, State of New York.

1945 tons, nine grade separation structures, Connecticut turnpike, Stamford - Darien, Conn.; also 1175 tons of reinforcing bars, and 525 tons of highway mesh; bids Nov. 21 at Hartford, Conn.

1335 tons, nine grade separation structures, Connecticut turnpike, Fairfield, Conn.; also 615 tons of reinforcing bars and 250 tons of highway mesh; bids Nov. 21 at Hartford, Conn.

1295 tons, five grade separation structures, Connecticut turnpike, Milford, Conn.; also 555 tons of steel piling, 540 tons of reinforcing bars, and 250 tons of highway mesh; bids Nov. 21 at Hartford, Conn.

1000 tons, approximately, two public schools, No. 58 and No. 262, Brooklyn, N. Y., bids asked.

945 tons, six grade separation structures, Connecticut turnpike, Milford-Orange, Conn.; also 670 tons of reinforcing bars and 180 tons of highway mesh; bids Nov. 21 at Hartford, Conn.

900 tons, warehouse, Philadelphia Transit Commission, Philadelphia; McCloskey & Co., Philadelphia, low on general contract.

460 tons, steel sheet piling; bids in to Corps of Engineers, Chicago.

330 tons, 3-span WF beam bridge, Winooski river, Montpelier, Vt.

300 tons, Montana state Yellowstone river bridge; general contract to Riedesel Construction Co., Billings, Mont., and Schye & Sullivan, White Sulphur Springs, joint low at $667,779.

250 tons, Montana state highway bridge, Big Horn county, general contract to Walter Makin, Billings, Mont., low at $275,071; subject to federal approval.

230 tons, state highway bridge, state route 30, Winhall, Vt.

100 tons, Roza power plant building; bids to Bureau of Reclamation, Yakima, Wash., Dec. 6.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1300 tons, textile finishing plant, Cone Mills Inc., Carlisle, S. C., to Owens Steel Co., Atlanta, Ga.; Daniel Construction Co., Greenville, S. C., general contractor.

1000 tons, Weyerhaeuser Timber Co., pulp mill at Grays Harbor, Wash., to Oregon Steel Mills Inc., Portland, Oreg.

900 tons, approach work, Philadelphia-Camden bridge, through Kaufman Construction Co., Philadelphia, to American Steel Engineering Co., Philadelphia.

615 tons, correctional institute buildings, DeQuincy, La., to Southwest Steel Products Inc., New Orleans; J. A. Jones Construction Co., Shreveport, La., general contractor.

450 tons, state bridge work, Ocean county, N. J., through Brann & Stewart, general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

250 tons, railroad relocation, Noxon power project, Montana, to Bethlehem Pacific Coast Steel Corp., Seattle; Peter Kiewit Sons Co., Longview, Wash., general contractor.

235 tons, Priest river state bridge, Idaho, to Bethlehem Pacific Coast Steel Corp., Seattle; Kiewit-Daugherty, joint contractors.

200 tons, state bridge work, Philadelphia, to American Steel Engineering Co., Philadelphia.

140 tons, manufacturing building, Rohm & Haas Co., Philadelphia, to Sweet's Steel Co., Williamsport, Pa.

120 tons, sewage plant, Philadelphia, through Acchione Contracting Co., general contractor, to Taylor-Davis Co., Philadelphia.

107 tons, additional Army facilities, near Spokane, Wash., to Soule Steel Co., Portland, Oreg.

100 tons, structurals and bars, hospital, Nantucket, Mass., to Plantations Steel Co., Providence, R. I., and Copley Steel Products Inc., Boston; D. D. Parrington Inc., Providence, general contractor.

REINFORCING BARS PENDING

192 tons, Roza power project, Washington state; bids to Bureau of Reclamation, Yakima, Wash., Dec. 6.

100 tons, two Washington state highway bridges; bids in.

PLATES . . .

PLATES PLACED

1000 tons, previously reported 100 plus, digester and tanks, Weyerhaeuser pulp mill, Cosmopolis, Wash., to Chicago Bridge & Iron Co., Seattle.

125 tons, No. 317 stainless steel, 40 to 30-in. pipe for Weyerhaeuser pulp mill at Grays Harbor, Wash., to Alaskan Copper & Brass Co., Seattle.

PLATES PENDING

600 tons, 48-in. pipeline, Seattle; Beall Pipe & Tank Corp., Portland, Oreg., low at $139,915.

600 tons, additional plate for tanks, Weyerhaeuser pulp mill at Grays Harbor, Wash.; to be placed as required by project engineer, Longview, Wash.

150 tons, storage water tank, Bellevue, Wash.; Chicago Bridge & Iron Co., Seattle, low.

PIPE . . .

CAST IRON PIPE PLACED

200,000 tons, approximately, 34-in. gas line pipe for one section of a project for the Trans-Canada Pipe Lines Ltd., to the National Tube Division, U. S. Steel Corp., Pittsburgh; pipe will be manufactured at McKeesport, Pa., and Orange, Tex.

RAILS, CARS . . .

LOCOMOTIVES PENDING

Norfolk & Western, twenty 1600-hp diesel engines; contemplated.

RAILROAD CARS PLACED

Boston & Maine, three rail diesel cars, to the Budd Co., Philadelphia.

Great Northern, 1000 boxcars, to own shops, for construction next year.

Norfolk & Western, 2050 freight cars, with 1500 seventy-ton hopper cars going to its Roanoke, Va., shops and 500 fifty-ton boxcars and 50 covered hopper cars going to the Pullman-Standard Car Mfg. Co., Chicago.

Orinoco Mining Co., subsidiary U. S. Steel Corp., 200 one-hundred-ton ore cars, to the Magor Car Corp., New York.

Union Tank Car Co., various types of freight cars, to be built in own shops at a cost of $10 million; details of program to be formulated.

Virginian, 500 seventy-ton hopper cars, to its Princeton, W. Va., shops.

RAILROAD CARS PENDING

Chesapeake & Ohio, 1000 hopper cars and 1000 gondola cars, program authorized by directors.

Lehigh Valley, 300 freight cars, pending.

Missouri-Kansas-Texas, 575 freight cars; purchase authorized by board of directors; list comprises 500 fifty-ton boxcars, 50 loader cars and 25 fifty-ton flatcars.

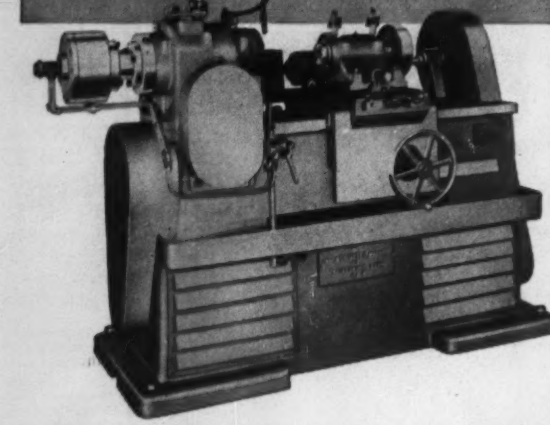
New York Central, 14,750 freight cars, bids asked; list comprises 5000 fifty-ton boxcars, 9250 seventy-ton self-clearing hopper cars and 500 seventy-ton covered hopper cars; these are in addition to 3000 boxcars and 200 covered hopper cars previously ordered this year from its subsidiary, Despatch Shops Inc., East Rochester, N. Y.

New York City, 500 subway cars; Transit Authority seeking program approval by Board of Estimate.

Western Pacific, 410 freight cars, contemplated.

How many operations are required to produce threaded parts of
NON FERROUS METALS
HEAT TREATED MATERIALS
OR VERY SHORT RUNS ?

ONLY **ONE**
WITH A **COULTER**
HOB THREAD MILLING MACHINE
and it does 'em faster, ***AUTOMATICALLY!***



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Learn how *all* the exclusive "H-1" features can thread better, faster — automatically. Inquire today!

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The James Coulter Machine Co.

631 Railroad Ave., Bridgeport, Conn.

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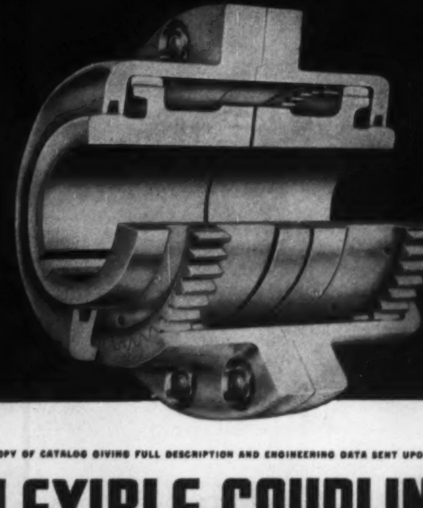
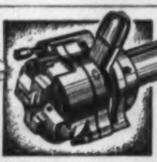


A COPY OF CATALOG GIVING FULL DESCRIPTION AND ENGINEERING DATA SENT UPON REQUEST.

FLEXIBLE COUPLINGS

POOLE FOUNDRY & MACHINE COMPANY WOODBERRY, BALTIMORE, MD.

H&G
Insert Chaser DIE HEADS



famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.

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Pacific Coast Representative: *A. C. Berbringer, Inc., 334 N. San Pedro St., Los Angeles, California.* Canada: *F. F. Barber Machinery Co., Toronto, Canada.*

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PRESSURE - STAINLESS
STAINLESS PIPE & FITTINGS

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TO YOUR REQUIREMENTS
FOR
ALL INDUSTRIAL USES
ARCHITECTURAL GRILLES
SEND FOR CATALOG NO. 39
DIAMOND MFG. CO.
BOX 32 WYOMING, PA.

Ores

Lake Superior Iron Ore

(Prices effective for the 1955 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports)

Old range bessemer	$10.40
Old range nonbessemer	10.25
Mesabi bessemer	10.25
Mesabi nonbessemer	10.10
Open-hearth lump	11.25
High phosphorus	10.00

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60-68%	20.00
N. African hematite (spot)...nom.	18.00-20.00
Brazilian iron ore, 68-69% (spot)	24.00-26.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality	$34.50-$35.00
Domestic, scheelite, mine	63.00

Manganese Ore

Mn 48%, nearby, 95c-$1.05 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; 46-47%, 75c-80c.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and African

48% 2.8:1 ...nom.	$45.00-$50.00
48% 3:1	42.00-44.00
48% no ratio	34.00

South African Transvaal

44% no ratio	$19.00-$20.00
48% no ratio	32.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked	$1.00

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

55-60%	$3.60-$3.85
60-65%	3.85-4.00

Vanadium Ore

Cents per lb V_2O_5 content, deld. mills

Domestic	31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $122; Salina, Pa., $127; Niles, O., $133.

Super-Duty: St. Louis, $150.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Portsmouth, O., Hawston, Pa., $128; Warren, Niles, O., Hays, Pa., $133; Morrisville, Pa., $131.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $138; Lehigh, Utah, $144; Los Angeles, $151.

Super Duty: Hays, Sproul, Hawston, Pa., Warren, Windham, O., Athens, Tex., $145; Morrisville, Pa., Niles, O., $148; Joliet, Ill., $151; Curtner, Calif., $163.

Semisilica Brick (per 1000)

Clearfield, Pa., $139; Philadelphia, $124; Woodbridge, N. J., $122.

Insulating Fire Brick (per 1000)

2300° F: Massillon, O., $178.50; Clearfield, Pa., $213; Augusta, Ga., Beaver Falls, Zelienople, Pa., Mexico, Mo., $206; Vandalia, Mo., $214.10; Portsmouth, O., $207.50; Bessemer, Ala., $212.80.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Mo., $88.50; Wellsville, O., $92.50; Clearfield, Pa., Portsmouth, O. $98.

High-Alumina Brick (per 1000)

50 Per Cent: Clearfield, Pa., St. Louis, Mexico, Mo., $194; Danville, Ill., $197; Philadelphia, $201.

60 Per Cent: St. Louis, Mexico, Vandalia, Mo., Clearfield, Pa., $241; Danville, Ill., $244; Philadelphia, $248.

70 Per Cent: St. Louis, Mexico, Vandalia, Mo., $279; Danville, Ill., $281; Clearfield, Pa., Philadelphia, $286.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $157; Clearfield, Pa., $158.50; St. Louis, $169.30.

Nozzles (per 1000)

Reesdale, Pa., $253.70; Johnstown, Pa. $259.20; Clearfield, Pa., $259.40; St. Louis, $259.45; Bridgeburg, Pa., $286.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $196; Clearfield, Pa., $198; St. Louis, $195.80.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Narlo, O., $15; Thornton, McCook, Ill., $15.60; Dolly Siding, Bonne Terre, Mo., $14.

Magnesite (per net ton)

Domestic, dead-burned, bulk, ⅛-in. grains with fines: Chewelah, Wash., $40; Luning, Nev., $40. ⅜-in. grains with fines: Baltimore, $66.40.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	$13.25-$14.00
Connellsville, foundry	16.00-17.00

Oven Foundry Coke

Kearny, N. J., ovens	$25.50
Camden, N. J., ovens	25.00
Everett, Mass., ovens New England, deld.	*27.05
Chicago, ovens	25.75
Chicago, deld.	27.25
Terre Haute, Ind., ovens	25.50
Milwaukee, ovens	26.25
Indianapolis, ovens	25.50
Portsmouth, O., ovens	24.75
Cincinnati, deld.	27.34
Painesville, O., ovens	26.25
Cleveland, deld.	28.18
Birmingham, ovens	24.40
Cincinnati, deld.	29.33
Buffalo, ovens	25.75
Buffalo, deld.	27.00
Lone Star, Tex., ovens	19.50
Neville Island, Pa., ovens	25.00
Philadelphia, ovens	25.00
Swedeland, Pa., ovens	25.00
St. Paul, ovens	25.00
Detroit, ovens	26.25
Detroit, deld.	27.25
Pontiac, deld.	27.81
Saginaw, deld.	29.33

*Or within $4.55 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	32.00-34.00
Industrial xylene	32.00-35.00

Per ton, bulk, ovens

Ammonium sulphate	$42-$45
Birmingham area	42.00†

†With port equalization against imports.

Cents per pound, producing point

Phenol: Grade 1, 14.00; Grade 2-3, 13.50; Grade 4, 15.50; Grade 5, 14.25.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $38-$39; 70%, $35-$36; 60%, $31-$32. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $34; Mexican, $25.50.

Electrodes

Threaded with nipple, unboxed, f.o.b. plant

Inches		Per
Diam	Length	100 lb
	GRAPHITE	
2	24	$52.50
2½	30	33.75
3	40	32.00
4	40	30.25
5½	40	30.00
6	60	27.25
7	60	26.75
8, 9, 10	60	24.25
12	72	27.25
14	60	23.50
16	72	22.50
17	60	23.00
18	72	22.50
20	72	22.25
	CARBON	
8	60	12.10
10	60	11.80
12	60	11.75
14	60	11.70
14	72	10.85
17	60	10.75
17	72	10.35
20	84	10.30
20	90	10.10
24	72, 84	10.30
24	96	10.05
30	84	10.20
40, 35	110	9.90
40	100	9.90

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INDUSTRIAL CUT GEARS

LARGE OR SMALL HEAT TREATED OR PLAIN

SIMONDS has over 60 years' experience in cutting quality industrial gears. We can supply any type of gear in cast or forged steel, gray iron, bronze, Meehanite, rawhide or bakelite in a full range of sizes adaptable to the material. Also heat-treated, case or flame hardened gears of carbon or alloy steel. Send us your requirements for quotation.

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SIMONDS' facilities can produce any type of custom gear from your blanks if you prefer. Same quality . . . same prompt service.

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BEVEL GEARS
MITRE GEARS
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Also stock carrying distributors of Ramsey Silent Chain Drives and Couplings; and industrial V-belts.

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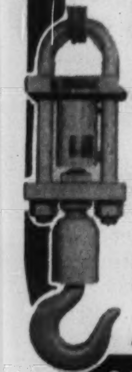

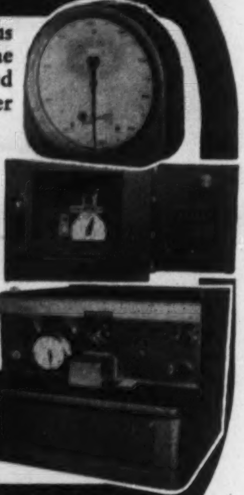

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MAT'L C.R. STEEL

The sketch briefly describes the cost of a typical part made for one of our thousands of customers.

We have a short run stamping service to offer beyond comparison.

$63.20 for first 100 pieces including tools. $5.20 for each additional 100 pieces plus material.

Factory trained representatives in all centers. Write for full details.

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Manufacturing Company
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any size or shape product; any size order from the smallest to the largest

Excellent facilities for pickling and oiling

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Stops Losses making Dies and Templates

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SPECIMEN
With DYKEM Steel Blue
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INTRODUCTION TO THE STUDY OF HEAT TREATMENT OF METALLURGICAL PRODUCTS
By Albert Portevin

Fundamental knowledge and essential principles of heat treatment of steel are presented in simple and understandable manner. Research engineers, metallurgical students and steel plant metallurgists engaged in metallurgical investigations and the heat treatment of ferrous and non-ferrous metals will find this book of inestimable value.

246 pages **4 tables**
69 Illustrations **Price $5.00 Postpaid**

THE PENTON PUBLISHING CO.
Book Department, 1213 W. 3rd St., Cleveland 13, O.

Scrap . . .

Scrap Prices, Page 184

Philadelphia—Prices on most grades of scrap are edging upward. No. 1 heavy melting, No. 1 bundles and No. 1 busheling are at a flat $47, delivered; machine shop turnings and mixed borings and turnings at $29.50; short shovel turnings at $32; and structurals and plate at $49-$51. Through error, malleable was quoted last week at $46-$46.50, delivered. The market was $59. Now it is quoted at $59-$59.50. Heavy breakable cast is stronger at $46.50, delivered, and drop broken machinery at $48-$49.

A small quantity of No. 1 cupola cast is reported to have been placed by the Fairless Hills consumer at around $44, delivered.

An unusual shipment for export involves a cargo of unstripped motor blocks. Part of the cargo is being loaded here at around $32, f.a.s. The remainder will be loaded at another port.

Pittsburgh—Demand is firm, but brokers say sales are low in comparison with the level of steel operations. Producers say their purchases are sizable enough to assure a good winter scrap inventory. Most recent purchases of No. 1 heavy melting were at $45 a ton. Since then no trends have developed, except that demand for No. 2 bundles has weakened and the price has dropped $1 a ton.

Cleveland—The tone of the market is strong in this area despite the absence of large new purchases by the mills. Prices are unchanged on the steelmaking grades, with heavy tonnage moving to the mills on contracts placed in recent weeks. Foundry steel grades also are strong. One substantial purchase of cut structurals and plates by a large automotive foundry here was reported at $51.

Cincinnati—Local prices have dipped under the impact of lower mill buying offers. No. 1 open hearth grades fell 50 cents to $41-$42. No. 2 heavy melting and No. 2 bundles both declined $1.50 to $34.50-$35.50 and $31.50-$32.50, respectively. Machine shop turnings went down $1.50 to $25.50-$26.50. Short shovel turnings fell $2 to $28-$29, and No. 1 cupola dropped $1.50 to $43.50-$44.50.

Boston—For district consumption, No. 1 heavy melting steel scrap, 5 ft and under, is up $1 a ton to $40 shipping point. No. 2 heavy melting and borings and turnings also are stronger, but No. 2 heavy melting for delivery to eastern Pennsylvania is unchanged. Cast grades are showing new strength. The first steel is being poured from one new electric furnace at Northeastern Steel Corp.'s works at Bridgeport, Conn. A second furnace will go into production late this month.

New York—Scrap brokers' buying prices are unchanged. But the market undertone is strong owing to activity in exports. Foreign movement is as high as at anytime this fall. Domestic buying is devoid of larger orders, but is described as steady.

Buffalo—Firm tendencies mark trading in scrap as dealers ship against outstanding orders placed recently. Record-breaking steel production and scrap consumption are bullish factors. Available supplies to meet current shipments are none too plentiful. Prices are unchanged.

Detroit—The scrap market shows little change. Prices on automotive lists are relatively the same as a month ago. Only minor adjustments are noted. No. 1 heavy melting, No. 1 bundles and No. 1 busheling are quoted at $39.50. No. 2 bundles are $28. The ingot rate last week was estimated at 99 per cent of capacity, against 97 the preceding week.

Chicago—A quiet situation prevails in scrap here, but, in general, the market tone is the strongest it has been in several weeks. A recent

(Please turn to page 186)

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Stainless
Steels

Immediate Delivery
from Stock

STRIP · Flat Wire and
other Stainless Steels

a foot or a pound
and up
to your EXACT requirements
from the BIGGEST little Converting Mill in the country.

Complete
Inventory

Phone:
COlony 9-7771
Wallingford, Conn.
Established 1924

STEEL IS 2 TO 3 TIMES
STRONGER THAN CAST IRON

STEEL IS 2½ TIMES AS RIGID
AS CAST IRON

STEEL COSTS ⅓ AS MUCH
PER POUND AS CAST IRON

thoughts to
think about

FIGURE the facts yourself. Only 40% as many pounds of metal are needed to build a machine part from steel as from cast iron. Furthermore, each pound of steel costs a third as much as iron. As a result, basic material costs using steel are about 15% of the costs using cast iron.

The large initial saving in material cost makes it possible to fabricate machine designs from steel at substantial reductions in cost.

ORIGINAL
CONSTRUCTION
Cost $664.33
PRESENT
WELDED STEEL
DESIGN
Cost $378.34

Compare the two gear cases shown. The original cast construction cost $664.33. Changing to welded steel design has cut this cost to $378.34 . . . a 43% reduction in cost. In addition, scrap loss from metal defects has been entirely eliminated. Less material has to be left on for machining since distortion has been minimized.

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THE LINCOLN ELECTRIC COMPANY
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The World's Largest Manufacturer
of Arc Welding Equipment

Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Nov. 9	$45.33
Nov. 2	45.17
Oct. Avg.	45.17
Nov. 1954	33.33
Nov. 1950	41.33

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

(Delivered consumer's plant)

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	40.00-41.00
No. 1 bundles	44.00-45.00
No. 2 bundles	*36.00-37.00*
No. 1 busheling	44.00-45.00
Machine shop turnings	29.00-30.00
Mixed borings, turnings	29.00-30.00
Short shovel turnings	33.00-34.00
Cast iron borings	33.00-34.00
Cut structurals, 3 ft lengths	49.00-50.00
Heavy turnings	42.00-43.00
Punchings & plate scrap	49.00-50.00
Electric furnace bundles	48.00-49.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Charging box cast	39.00-40.00
Heavy breakable cast	39.00-40.00
Unstripped motor blocks	29.00-30.00
No. 1 machinery cast	*50.00-51.00*

Railroad Scrap

No. 1 R.R. heavy melt.	49.00-50.00
Rails, 2 ft and under	58.00-59.00
Rails, 18 in. and under	59.00-60.00
Rails, random lengths	55.00-56.00
Railroad specialties	54.00-55.00

Stainless Steel Scrap

18-8 bundles & solids	270.00-285.00
18-8 turnings	130.00-140.00
430 bundles & solids	100.00-110.00
430 turnings	60.00-65.00

CLEVELAND

(Delivered consumer's plant)

No. 1 heavy melting	45.00-46.00
No. 2 heavy melting	40.00-41.00
No. 1 bundles	45.00-46.00
No. 2 bundles	35.00-36.00
No. 1 busheling	45.00-46.00
Machine shop turnings	23.00-24.00
Mixed borings, turnings	27.50-28.50
Short shovel turnings	27.50-28.50
Cast iron borings	27.50-28.50
Low phos.	45.00-46.00
Cut structural plates 2 ft and under	50.00-51.00
Alloy free, short shovel turnings	31.00-32.00
Electric furnace bundles	45.50-46.50

Cast Iron Grades

No. 1 cupola	47.00-48.00
Charging box cast	40.00-41.00
Stove plate	46.00-47.00
Heavy breakable cast	37.00-38.00
Unstripped motor blocks	29.00-30.00
Brake shoes	35.00-36.00
Clean auto cast	48.00-49.00
Burnt cast	37.00-38.00
Drop broken machinery	49.00-50.00

Railroad Scrap

No. 1 R.R. heavy melt.	45.00-46.00
R.R. malleable	53.00-54.00
Rails, 2 ft and under	62.00-63.00
Rails, 18 in. and under	63.00-64.00
Rails, random lengths	58.00-59.00
Cast steel	48.00-49.00
Railroad specialties	54.00-55.00
Uncut tires	49.00-50.00
Angles, splice bars	54.50-55.50
Rails, rerolling	63.00-64.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	290.00-300.00
18-8 turnings	120.00-140.00
430 clips, bundles, solids	90.00-100.00
430 turnings	40.00-50.00

YOUNGSTOWN

(Delivered consumer's plant)

No. 1 heavy melting	47.50-48.50
No. 2 heavy melting	35.00-36.00
No. 1 bundles	47.50-48.50
No. 2 bundles	32.00-33.00
No. 1 busheling	47.50-48.50
Machine shop turnings	24.00-25.00
Short shovel turnings	29.00-30.00
Cast iron borings	29.00-30.00
Low phos.	47.50-48.50
Electric furnace bundles	47.50-48.50

Railroad Scrap

No. 1 R.R. heavy melt.	48.00-49.00

CHICAGO

No. 1 heavy melting	43.00-46.00
No. 2 heavy melting	34.00-35.00
No. 1 factory bundles	46.00-47.00
No. 1 dealer bundles	43.00-44.00
No. 2 bundles	33.00-34.00
No. 1 busheling	43.00-46.00
Machine shop turnings	27.00-28.00
Mixed borings, turnings	29.00-30.00
Short shovel turnings	29.00-30.00
Cast iron borings	29.00-30.00
Cut structurals, 3 ft.	47.00-48.00
Punchings & plate scrap	48.00-49.00

Cast Iron Grades

No. 1 cupola	47.00-48.00
Stove plate	*38.00-39.00*
Unstripped motor blocks	34.00-35.00
Clean auto cast	50.00-51.00
Drop broken machinery	50.00-51.00

Railroad Scrap

No. 1 R.R. heavy melt.	*48.00-49.00*
R.R. malleable	56.00-57.00
Rails, 2 ft and under	60.00-61.00
Rails, 18 in. and under	61.00-62.00
Angles, splice bars	57.00-58.00
Rails, rerolling	65.00-66.00

Stainless Steel Scrap

18-8 bundles & solids	*310.00-325.00*
18-8 turnings	*215.00-225.00*
430 bundles & solids	100.00-105.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*39.50*
No. 2 heavy melting	30.00
No. 1 bundles	*39.50*
No. 2 bundles	*28.00*
No. 1 busheling	*39.50*
Machine shop turnings	22.00
Mixed borings, turnings	22.00
Short shovel turnings	24.00
Punchings & plate scrap	48.00

Cast Iron Grades

No. 1 cupola	40.00
Charging box cast	33.00
Stove plate	32.00
Heavy breakable	32.00
Unstripped motor blocks	22.00
Clean auto cast	44.00
Malleable	35.00

BIRMINGHAM

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	35.00-36.00
No. 1 bundles	38.00-39.00
No. 2 bundles	28.00-29.00
No. 1 busheling	38.00-39.00
Cast iron borings	17.00-18.00
Short shovel turnings	28.00-29.00
Machine shop turnings	27.00-28.00
Electric furnace bundles	43.00-44.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	47.50-48.00
Stove plate	44.50-45.50
Bar crops and plate	47.00-48.00
Structural plate, 2 ft.	46.00-47.00
Unstripped motor blocks	36.00-37.00
Charging box cast	30.00-31.00
No. 1 wheels	38.00-39.00

Railroad Scrap

No. 1 R.R. heavy melt.	43.00-44.00
Rails, 18-in. and under	58.50-59.50
Rails, rerolling	58.00-59.00
Rails, random lengths	53.00-54.00
Angles, splice bars	55.00-56.00

PHILADELPHIA

(Delivered consumer's plant)

No. 1 heavy melting	*47.00*
No. 2 heavy melting	41.00
No. 1 bundles	*47.00*
No. 2 bundles	37.00-38.00
No. 1 busheling	*47.00*
Electric furnace bundles	48.50
Machine shop turnings	*29.50*
Mixed borings, turnings	*29.50*
Short shovel turnings	*32.00*
Structurals & plate	*49.00-51.00*
Heavy turnings	43.00
Couplers, springs, wheels	52.00
Rail crops, 2 ft & under	59.00-60.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Malleable	*59.00-59.50*
Heavy breakable cast	*46.50*
Drop broken machinery	*48.00-49.00*

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	41.00-42.00
No. 2 heavy melting	37.00-38.00
No. 1 bundles	41.00-42.00
No. 2 bundles	32.00-33.00
Machine shop turnings	20.00-21.00
Mixed borings, turnings	21.00-22.00
Short shovel turnings	22.00-23.00
Low phos. (structural & plate)	42.00-43.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	38.00-39.00

Stainless Steel

18-8 sheets, clips, solids	290.00-300.00
18-8 borings, turnings	150.00-160.00
430 sheets, clips, solids	120.00-125.00
410 sheets, clips, solids	100.00-105.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*37.50-40.00*
No. 2 heavy melting	*31.50-32.00*
No. 1 bundles	*37.50-39.00*
No. 2 bundles	28.00-28.50
Machine shop turnings	*21.00-21.50*
Mixed borings, turnings	*23.00-23.50*
Short shovel turnings	*24.00-24.50*
No. 1 cast	*36.00-36.50*
Mixed cupola cast	*34.00-34.50*
No. 1 machinery cast	*39.00-39.50*

BUFFALO

No. 1 heavy melting	43.00-44.00
No. 2 heavy melting	37.00-38.00
No. 1 bundles	43.00-44.00
No. 2 bundles	32.00-33.00
No. 1 busheling	43.00-44.00
Mixed borings, turnings	29.00-30.00
Machine shop turnings	27.00-28.00
Short shovel turnings	30.00-31.00
Cast iron borings	30.00-31.00
Low phos.	47.00-48.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	40.00-41.00
No. 1 machinery	43.00-44.00

Railroad Scrap

Rails, random lengths	47.00-48.00
Rails, 2 ft and under	51.00-52.00
Railroad specialties	48.00-49.00

CINCINNATI

Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*41.00-42.00*
No. 2 heavy melting	*34.50-35.50*
No. 1 bundles	*41.00-42.00*
No. 2 bundles	*31.50-32.50*
No. 1 busheling	*41.00-42.00*
Machine shop turnings	*25.50-26.50*
Mixed borings, turnings	24.75-25.75
Short shovel turnings	*28.00-29.00*
Cast iron borings	24.75-25.75
Low phos., 18 in.	50.00-51.00

Cast Iron Grades

No. 1 cupola	*43.50-44.50*
Heavy breakable cast	41.00-42.00
Charging box cast	41.00-42.00
Drop broken machinery	49.00-50.00

Railroad Scrap

No. 1 R.R. heavy melt.	44.00-45.00
Rails, 18 in. and under	60.00-61.00
Rails, random lengths	53.00-54.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	38.50
No. 2 heavy melting	36.00
No. 1 bundles	39.50
No. 2 bundles	31.50
Machine shop turnings	28.00
Short shovel turnings	28.00

Cast Iron Grades

No. 1 cupola	46.50
Charging box cast	39.00
Heavy breakable cast	37.00
Unstripped motor blocks	37.00
Brake shoes	36.00
Clean auto cast	47.00
Stove plate	28.00

Railroad Scrap

No. 1 R.R. heavy melt.	48.00
Rails, 18 in. and under	59.00
Rails, random lengths	56.00
Rails, rerolling	64.00
Angles, splice bars	55.00

SEATTLE

(Delivered consumer's plant)

No. 1 heavy melting	44.00
No. 2 heavy melting	40.00
No. 1 bundles	39.50
No. 2 bundles	34.00
No. 3 bundles	19.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Short shovel turnings	15.00-16.00
Electric furnace, No. 1	50.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	42.00
Heavy breakable cast	38.00
No. 1 wheels	35.00
Unstripped motor blocks	29.00
Clean motor blocks	40.00
Stove plate (f.o.b. plant)	30.00
Brake shoes	35.00

Railroad Scrap

(Delivered consumer's plant)

Rails, random lengths	38.00

LOS ANGELES

No. 1 heavy melting	39.00
No. 2 heavy melting	37.00
No. 1 bundles	39.00
No. 2 bundles	35.00
Machine shop turnings	12.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	43.00-45.00

SAN FRANCISCO

No. 1 heavy melting	39.00
No. 2 heavy melting	37.00
No. 1 bundles	39.00
No. 2 bundles	33.00
No. 1 busheling	39.00
Machine shop turnings	18.00
Mixed borings, turnings	18.00
Short shovel turnings	20.00
Cast iron borings	18.00
Cut structurals	41.00
Heavy turnings	20.00
Punchings & plate scrap	39.00

Cast Iron Grades

No. 1 cupola	47.00-48.00
Charging box cast	35.00
Stove plate	39.00
Heavy breakable cast	36.00
Unstripped motor blocks	32.00
Brake shoes	35.00
Clean auto cast	45.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	48.00

HAMILTON, ONT.

(Delivered prices)

No. 1 heavy melting	38.50
No. 2 heavy melting	35.50
No. 1 bundles	38.50
No. 2 bundles	32.50
Mixed steel scrap	32.50
Mixed borings, turnings	17.00
Rails, remelting	47.50
Bushelling, new factory:	
Prepared	36.50
Unprepared	32.50
Short steel turnings	21.00

Cast Iron Grades†

No. 1 machinery cast	42.00-45.00

---

†F.o.b., shipping point.

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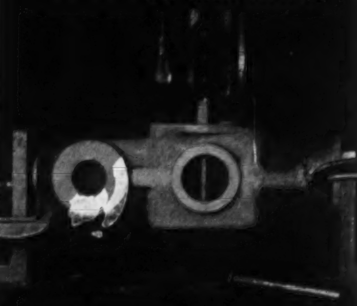

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(Concluded from page 183)

purchase of industrial No. 1 heavy melting steel by a leading mill at $46, delivered, restored this grade to the level which prevailed a month ago.

Birmingham—District steel mills were out of the market last week, and there was no movement of openhearth grades for domestic use.

Los Angeles—Scrap prices have steadied somewhat after months of uncertain fluctuation.

Seattle—Steel scrap continues firm. Receipts are heavy; export interest is unabated.

Iron Ore . . .

Iron Ore Prices, Page 181

Shipments of Lake Superior iron ore totaled 2,167,799 gross tons in the week ended Nov. 7, reports the Lake Superior Iron Ore Association. This compares with shipments of 1,143,789 tons a year ago.

Cumulative shipments in the 1955 navigation season to Nov. 7 were 81,777,931 tons.

National Tube Gets Large Order

About 200,000 tons of 34-in., high-pressure steel pipe has been placed with National Tube Division, United States Steel Corp., by Trans-Canada Pipe Lines Ltd. for the western leg of its gas pipeline project.

When completed in 1957, the pipeline will extend 2300 miles from the Alberta-Saskatchewan border to Montreal, Que. It will involve the largest tonnage of steel pipe ever used for a single pipe system. Tonnage could be as high as 800,000 tons.

Ferroalloy Prices

FERROALLOY quotations remain unchanged. The current price schedule was published in full on page 203 of the Nov. 7 issue of STEEL.

The welded pipe, produced in 40-ft lengths and weighing 355 tons per mile, will be manufactured from plate at National Tube's McKeesport, Pa., and Orange, Tex., plants. The tonnage is booked beginning in February and will be completed in late summer. The western leg, which is the only section for which firm commitment has been made, will run from the Alberta-Saskatchewan border to Winnipeg, Man., about 500 miles.

Because of the large amount of pipe involved for the over-all project, the industry believes it will be split up among several companies. Spokesmen say no single company would want an order that large, because it would tie up all of its capacity for too long a period. The National Tube order alone is just under the industry's average per-month shipments for the first eight ness this year.

The increased activity in pipeline construction has been one of the contributing factors in the plate tightness this year.

Tin Plate . . .

Tin Plate Prices, Page 168

American Can Co. announced a 5.7 per cent increase in can prices. Effective Nov. 1, the rise reflects higher material and labor costs.

CLASSIFIED

Help Wanted

TITANIUM METALLURGIST. Either experienced man or one interested in entering this field covering titanium production in mill converting to bars, forgings, sheet, strip and wire. Work will include both the technical and production aspects of material. Send information giving education, experience, age references, etc. Reply Box 330, STEEL, Penton Building, Cleveland 13, Ohio.

METALLURGIST

Steel Foundry in East desires services of graduate metallurgist with some experience in acid and basic melting procedures and sand control. Please give full particulars regarding background and salary desired in first letter. Reply Box 334, STEEL Penton Bldg., Cleveland 13, Ohio.

PLANT ENGINEER

With Electrical background for malleable iron foundry in New England. Must have had experience in supervising foundry plant maintenance. Full details will be given in personal interview. Write, giving all pertinent information to Box 335, STEEL, Penton Building, Cleveland 13, Ohio.

ASSISTANT CHIEF PLANT ENGINEER, B. S. MECHANICAL ENGINEERING. Qualified to assume duties of Chief Engineer in near future. Must have experience with plant mechanical problems. East St. Louis, Illinois, chemical and metallurgical plant. Reply Box 337, STEEL, Penton Bldg., Cleveland 13, Ohio.

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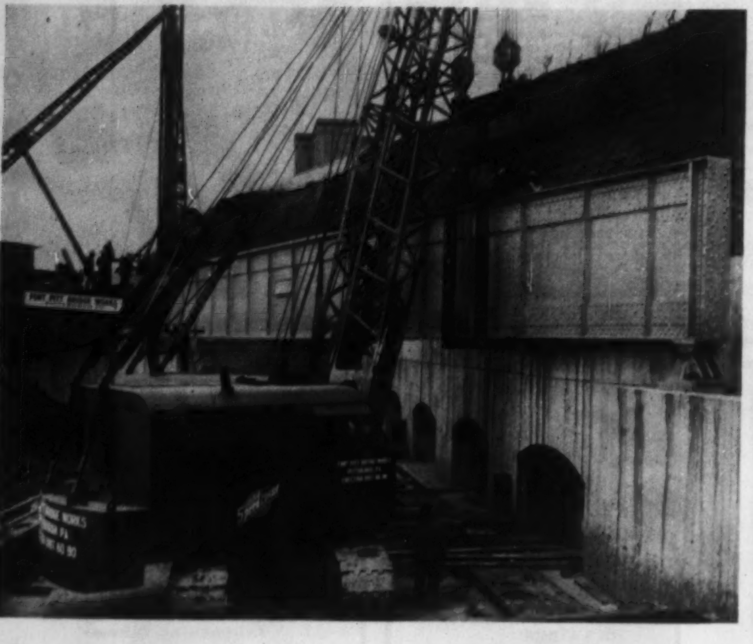

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HAND PROTECTION

Measure glove cost by PERFORMANCE . . . not PRICE!

The difference between *first costs* and *replacement costs* is the difference between ordinary work gloves and Jomac Gloves. While bargain buys are wearing out and are being replaced, sturdy Jomacs are being used, cleaned or reconditioned, and reused again and again. Jomac quality means better service, longer life, lower *net* costs.

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Jomac manufactures all types of hand and forearm protection — all made from famous loop-pile Jomac Cloth. This porous fabric cushions hands against sharp metal, insulates them against extreme heat. Get full details. Write for the new Jomac Industrial Work Gloves Catalog. Jomac Inc., Dept. E, Phila. 38, Pa.

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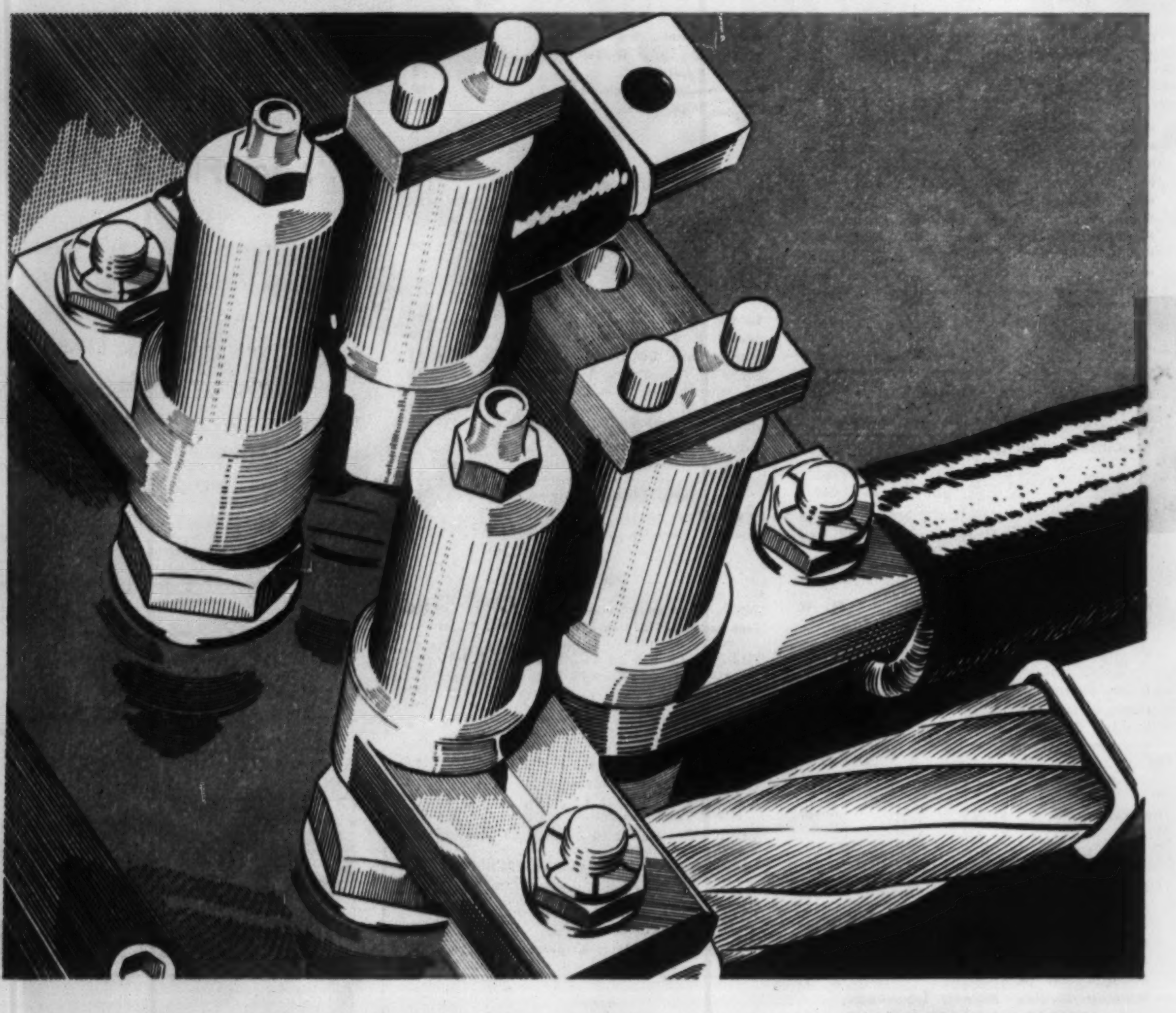
INDUSTRIAL WORK GLOVES

PROOF that quality means economy

FLEXLOC AT WORK



DESIGNER OF WELDING DIE uses one-piece, all-metal thin FLEXLOCS as stop nuts on flexible cable assembly. Although the assembly swivels, FLEXLOCS won't work loose.

Nuts that loosen cause trouble. Contact is poor; flow of current erratic; welding faulty—and faulty welding means inferior finished jobs.

Don't take any chance of nuts loosening on vital assemblies. FLEXLOCS are made to stay put. And they are available in a wide range of sizes, types and material. See your authorized industrial distributor for Bulletin 866 and samples. Or write STANDARD PRESSED STEEL CO., Jenkintown 33, Pa.

• • •

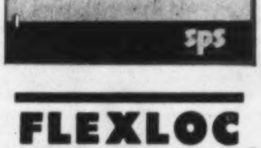
Use FLEXLOCs anywhere safely

ON ROUGH BOLTS. They'll smooth out bolt threads without damaging the threads of the nut.

IN TEMPERATURES TO 550°F in plated nuts and even higher in unplated ones. High temperatures do not affect FLEXLOCS. Nuts with non-metallic inserts fail under such conditions.

AS STOP OR LOCK NUTS. After at least 1½ threads of a standard bolt are past the top of the nut, the FLEXLOC stays put.

REGARDLESS OF MOISTURE, OIL, DIRT OR GRIT. None of these conditions make any difference to a FLEXLOC, and vibration won't loosen it.



FLEXLOC SELF-LOCKING NUTS

sps

FLEXLOC®

LOCKNUT DIVISION

SPS

JENKINTOWN PENNSYLVANIA

Lubrication is automatic on Sundstrand's "Engineered Production" machine tools

FARVAL—
Studies in
Centralized
Lubrication
No. 182

The idea behind Sundstrand "Engineered Production" Service makes sense: Manufacturer and Sundstrand Engineers work closely together to find the best processing method for the job at hand. The result is the same as you experience with a custom-tailored suit—it fits.

FARVAL fits Sundstrand pattern

Farval Centralized Systems of Lubrication, like Sundstrand Machine Tools, are engineered for the job. Where there are bearings to be lubricated, Farval will make sure the job is done correctly. That's why Sundstrand chooses Farval—and why other machine-tool specialists are doing likewise.

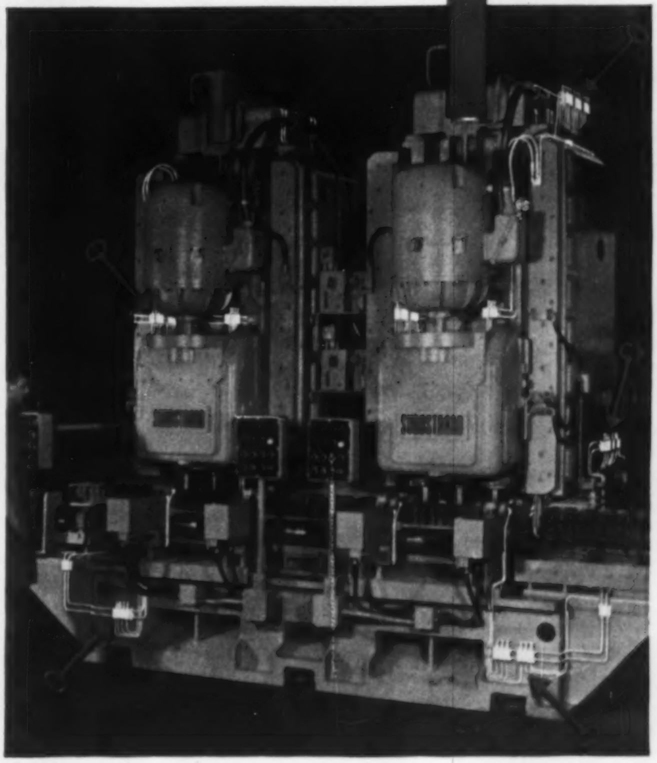
It works like this: As *the* Dualine system of centralized lubrication, Farval delivers a measured amount of clean lubricant at regular intervals to *every* bearing in the Farval circuit. From a centrally located pump and reservoir, lubricant is pumped under pressure, to a measuring valve at each bearing. The exact amount of lubricant required by the bearing is delivered to it. And, indicators at every bearing show *positive proof* that each valve has functioned.

Let Farval help you

Lubrication problems that seem tough for you are a cinch for Farval. One of our lubrication engineers will be glad to inspect your plant and present a written analysis of what Farval can do for you. This service is without obligation, of course. If you'd like the complete Farval story, just write for Bulletin 26-R. The Farval Corporation, 3270 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Co., Industrial Worm Gearing. In Canada: Peacock Brothers Limited.

FARVAL
CENTRALIZED
SYSTEMS OF
LUBRICATION



This is a Sundstrand two station rough boring unit for 6 cylinder engine blocks.

KEYS TO ADEQUATE LUBRICATION—Wherever you see these Farval valve manifolds, dual lubricant lines and central pumping station, you know a machine is being properly lubricated.

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